

Omega Liner Company, Inc.
(Petitioner)

V.

Buergofol GmbH
(Patent Owner)

Petitioner's Demonstratives

Case No. IPR2023-01372
U.S. Patent No. 9,657,882 B2

Omega Exhibit 1086
Omega v. Buergofol
IPR2023-01372

Table of Contents

Background of CIPP Liners and Slip Additives	7
Claim Construction is Unnecessary	14
Challenged Claims Are Obvious	22
Hummel + Schuhmann	24
Hummel + Nagai	38
No Secondary Evidence of Nonobviousness	45
PO Failed to Compare Results to Closest Prior Art	47
Constab PE-SA 270 Used as “Migrating Compound” in Examples B4-B6	49
Results Lack Both Commensurability and Nexus to Claim Scope	54
Results Are Expected	61
Appendix	66
Hummel (Anticipation)	67
Declarations Lack Credibility	71

Summary: Hummel + Schuhmann Teaches All Elements

- PO does not deny Hummel + Schuhmann teaches all elements of the Challenged Claims under any construction. (POR; PO Sur-Reply; Pet. Reply, 3.)
- PO only improperly argues “**bodily incorporation**” and **solely Hummel’s need**. (POR, 45-53; PO Sur-Reply, 8-10; Pet. Reply, 2, 4, 5, 6, 8.)

Summary: Hummel + Nagai Teaches All Elements

- PO does not deny Hummel + Nagai teaches all elements of the Challenged Claims under any construction except for claim 11 based on contorted claim construction. (POR; PO Sur-Reply; Pet. Reply, 3.)
- PO only improperly argues “**bodily incorporation**” and **solely Hummel’s need**. (POR, 45-53; PO Sur-Reply, 8-10; Pet. Reply, 2, 4, 5, 6, 8.)

Summary: PO's Fatal "Nexus" Problems

- No identification **unknown** "slow migration antiblock additive" in Constab PE-SA 270 (Pet. Reply, 10, 16-19.)
- No nexus with **non-migrating compounds** added (polyethylene and calcium carbonate) providing **expected results**. (Pet. Reply, 11-15.)
- No identification of **unaccounted for 1%** of composition in Example B5. (Pet. Reply, 12.)
- PO's declarations **lack any credibility**. (Pet. Reply, 15-21.)

Summary: PO's Fatal "Commensurability" Problems

- No comparison to **closest prior art** (Hummel or Nagai). (Pet. Reply, 9.)
- **Comparative example V1** is within claim scope and has no unexpected results. (Pet. Reply, 12.)
- No test results for claimed **"applied over" migrating compound**. (Pet. Reply, 10.)
- No test results for **other claimed "migrating compounds."** (Pet. Reply, 10-11.)
- No test results with claimed **"reactive plastic resin."** (Pet. Reply, p. 12.)

Background of CIPP Liners and Slip Additives

1972: Wood: Inventor of CIPP Liners

U.S. Patent No. 4,009,063 (Wood) – CIPP Liner (EX1012)

United States Patent [19]		[11]	4,009,063
Wood		[45]	Feb. 22, 1977
[54] METHOD OF LINING A PIPE		[56] References Cited	
[75] Inventor: Eric Wood, Ossett, England		UNITED STATES PATENTS	
[73] Assignee: Insituform (Pipes and Structures) Limited, Horbury Junction, near Wakefield, England		3,028,284	4/1962 Reeves 264/257
[22] Filed: Jan. 29, 1975		3,061,496	10/1962 Meyer 156/276
[21] Appl. No.: 544,879		3,093,160	6/1963 Boggs 264/257
[63] Continuation of Ser. No. 282,071, Aug. 21, 1972, abandoned.		3,230,129	1/1966 Kelly 156/294
[52] U.S. Cl.: 156/71; 61/45 R; 138/97; 138/141; 156/94; 156/148; 156/257; 156/294; 220/63 R; 264/257; 264/269; 264/314; 156/93		3,340,115	9/1967 Rubenstein 156/294
[51] Int. Cl.: E03B 7/00		3,396,545	8/1968 Lamberton 61/45 R
[58] Field of Search: 138/97, 141; 61/45 R; 61/45 B; 85; 220/63 R; 64; 156/71, 94, 294, 148, 93; 264/257, 267, 269, 314; 137/14		3,509,725	5/1970 Schabel 61/85
		3,511,734	5/1970 Darrow 264/269
		3,524,320	8/1970 Turzillo 61/45 R
		3,773,593	11/1973 Casadell et al. 156/294
		Primary Examiner—Edward G. Whitby	
		Attorney, Agent, or Firm—Harrington A. Lackey	
		ABSTRACT	
		A method of lining a passageway with a hard, rigid pipe of thermosetting resin, wherein a tubular fibrous felt is immersed in the resin to form a carrier for the resin. The immersed felt and resin have an inflatable tube therein and this tube is inflated to shape the resin to the passageway surface. The resin is cured to form the hard, rigid lining pipe with the felt embedded therein.	
		19 Claims, 9 Drawing Figures	

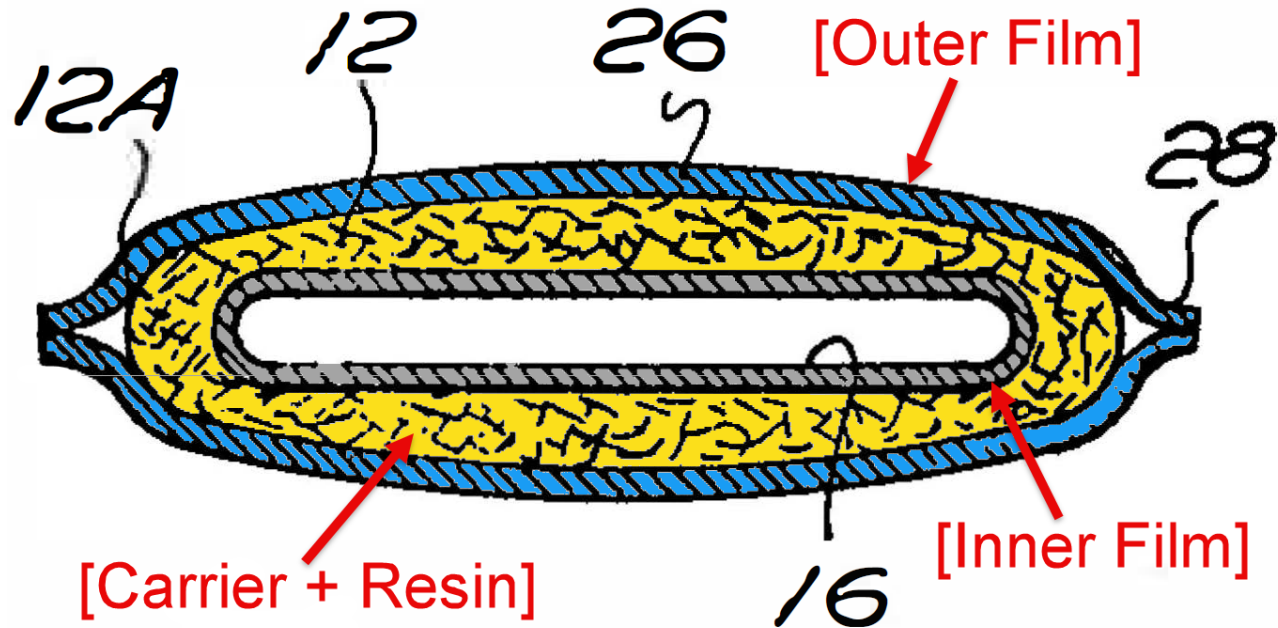
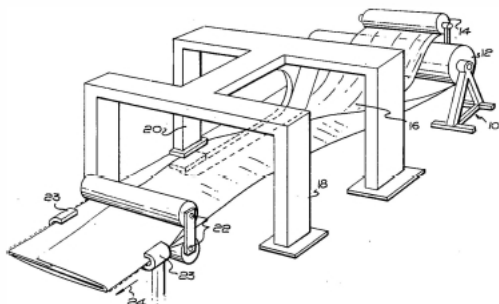


FIG. 2



(EX1012, Cover, Fig. 2, Pet., 5-7.)

DEMONSTRATIVE EXHIBIT - NOT EVIDENCE

1972: Wood: CIPP Liner Installation Process

U.S. Patent No. 4,009,063 (Wood) – CIPP Liner (EX1012)

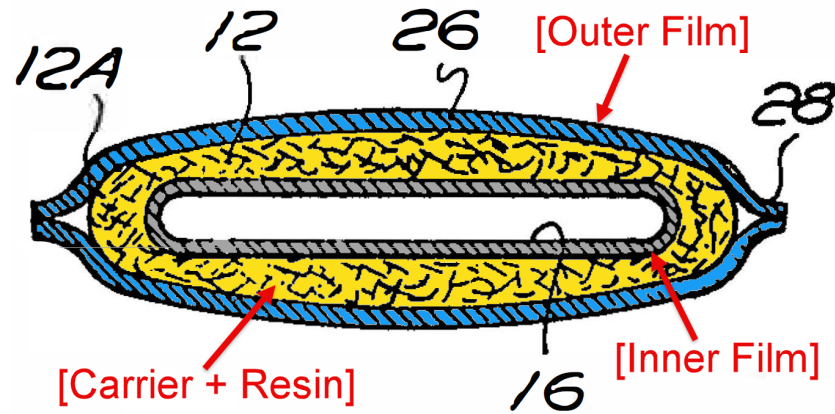


FIG. 2

(EX1012, Figs. 2-4, 8:1-8; Pet., 5-7.)

8
the tube and ensure that wrinkles are removed therefrom. Air pressure is maintained in the tube until the resin in which the intermediate layer 12 is immersed is cured hard forming a complete rigid lining tube. In order to prevent build up of heat in the tube which could result in melting of the inner lining 16, the downward end of the tube is preferably cut to form an opening 94 after initial inflation of the tube is complete.



FIG. 3

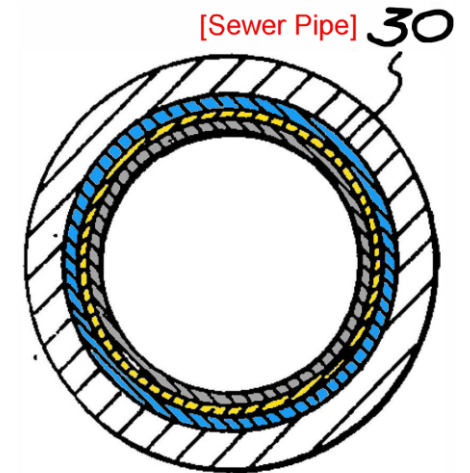


FIG. 4

1972: Wood: Removal of Inner Film After Curing

U.S. Patent No. 4,009,063 (Wood) – CIPP Liner (EX1012)

5
4,009,063
6

tube, the inner tube is inflated by fluid pressure whilst the fibrous sheet structure is wrapped round the inflated tube.

In yet a further alternative, a carded web is fed to a mandrel which is rotated, the arrangement being that the web takes up a coiled continuously tubular form fed off continuously from the mandrel, the coils of the web being overlapped, and the inner tube 12 being fed into the coiled web along the mandrel axis.

In order to line the surface defining an underground sewer, the tubular laminate as indicated in FIG. 2 is first of all treated so as completely to immerse the felt 12 in uncured synthetic resin 12A. This can be done in any suitable manner and one method (illustrated in FIG. 5) we have found to be suitable is to puncture the outer tube 26 and insert the uncured resin by pumping or injection. Another method is to inject the resin by long tubes extending lengthwise of the tube and between the inner and outer tubes. The resin is absorbed quickly by and immerses the felt 12, and if absorption does not take place evenly then the distribution of the resin throughout the felt can be improved by passing the flattened tube through the nip of a pair of nip rollers (see FIG. 5).

Whilst the resin remains uncured the tubular laminate is still flexible and in order to line a sewer with the tubular laminate as indicated in FIG. 3 it is simply a matter of entering the laminate into the sewer and then inflating same for example with air under pressure from a fan or blower so that the laminate takes up the shape of the sewer wall as shown in FIG. 3, the tube being closed at its ends to enable inflation to take place or inflated by means of an inflatable bag positioned in the tube. With the tube so inflated, the uncured resin is either allowed to cure naturally or is cured under the action of heat depending upon which type of resin is used so that a hard, rigid lining of cured resin is formed in the passageway. By inflating the tube, the tube is pressed outwardly against the sewer wall indicated by the arrows in FIG. 3. FIGS. 5, 6, 7, 8 and 9 to be referred to later illustrated in detail the placement of the tubular laminate in the sewer.

FIG. 4 shows how the tubular laminate may be used for the lining of a pipe 30.

To line a complete sewer or pipe line with rigid linings, it may be necessary to use a number of tubular laminates which are overlapped and/or joined end to end but the technique of using fluid pressure to urge each laminate against the surface to be lined is followed in each case.

The inner tube 16 may be of a material which is or becomes firmly bonded to the resin carried by felt 12 or alternatively after the curing of the resin, it may be capable of removal from the cured resin depending upon the materials used for the tube 16 and the resin which is used.

Referring to FIG. 5, a preformed tubular laminate such described with reference to FIG. 2 is folded into a receptacle 32 from which the tube 34 is fed over a top roller 36. The tube 34 is fed downwardly through pairs of intermediate pressure rollers 38, 40 and 42 into the nip of a pair of rollers 44 each of which has an outer surface of compressible resilient material 46 such as polyurethane foam. The tube coming from the container 32 has no resin in the fibrous sheet 12 and to insert the necessary resin two operators are stationed one to each side of the flat band of tubing before it reaches the rollers 38. To inject the required resin into

the fibrous mat, each operator makes a cut through the outer layer 26 of the tube and inserts into the cut a nozzle 48 which may be supplied with resin from a reservoir 50 by way of pumps P. After making the cut, the operator starts the pump and continues running the pump until sufficient resin has been injected into the fibrous mat to form a reservoir extending upwardly from rollers 44 to the height of the nozzles 48. It will be understood that during this time the tube will be moving slowly downward and the operator will be moving the nozzle downwardly with the tube. When sufficient resin has been injected into the fibrous mat each operator switches off his pump, removes the nozzle and applies a patch to the slit that has been cut in the tube. The patch may conveniently be a patch of self adhesive plastics material. The patch is applied to the tube before this reaches the topmost pair of rollers 38 and it will be understood that the operators must make the cuts in the outer layer 26 sufficiently far above these rollers 38 to allow enough resin to be injected and the patch applied while the cut part of the tube is travelling towards the rollers 38 and before it reaches these rollers. As the tube travels downwardly between rollers, 38, 40 and 42, these help to immerse the fibrous mat in resin, and this is finally completed in the nip between rollers 44. Once the length of tube containing resin with immersed felt 12, the intermediate layer approaches the nip rollers 44 each operator cuts a further slit in the outer layer 26 and injects more resin into the intermediate layer, subsequently applying a patch as previously explained. This procedure is repeated along the length of the tube leaving the rollers 44 has the fibrous mat fully immersed in the resin.

On leaving the rollers 44, the tube is received by a conveyor belt 50 which, when the tube is to be installed underground moves the tube towards and lowers it into a manhole 52.

The conveyor 50 is driven by a positive drive which can not be overrun. This achieves a uniform feed of the tube which would otherwise be difficult to obtain. If the tube is being lowered to any substantial depth then the weight of that part of the tube that is being lowered at any one time, can be very high. This could have one effect of the tube driving the conveyor faster, but this is prevented by providing the conveyor with a drive that cannot be over run. The frictional engagement between the conveyor and the length of the tube resting on the conveyor acts as sufficient of a brake to support the length of tube that is being lowered into the manhole. Furthermore, the tube is lowered without applying any clamping or squeezing force to the tube, which is important as the resin is still in liquid state and if the tube were clamped or squeezed some local displacement of resin could occur, leading to non-uniform properties in the hard tube after curing of the resin. In order to achieve the non-over running effect in the drive to the conveyor 50 the drive may incorporate an irreversible worm and pinion or the drive may be by way of an electric motor with inductive braking.

For handling the tube in this way, it may be desirable to provide the tube with some form of reinforcement at the ends. In this connection FIG. 6 shows the trailing end of a tube, the majority of the length of which comprises the inner and outer layers 16 and 26 of flexible polymeric material and the intermediate fibrous mat 12 which is immersed in resin. The mat 12 is, at the end of this mat stitched to a length 54 of a strong woven fabric formed into a tube. The preferred fabric is a plain

The inner tube 16 may be of a material which is or becomes firmly bonded to the resin carried by felt 12 or alternatively after the curing of the resin, it may be capable of removal from the cured resin depending upon the materials used for the tube 16 and the resin which is used. (EX1012, 5:51-56; Pet., 7.)

1992: PO's Expert – Slip Additives “Well-Known”

U.S. Pat. No. 5,114,763 (Brant – PO's Expert) (EX1043)

United States Patent [19]

Brant et al.

[11] Patent Number: **5,114,763**

[45] Date of Patent: **May 19, 1992**

[54] TACKIFIED POLYETHYLENE LAYERS IN STRETCH/CLING FILMS

[75] Inventors: **Patrick Brant**, Seabrook; Paul M. German, Friendswood, both of Tex.

[73] Assignee: **Exxon Chemical Patents Inc.**, Linden, N.J.

[21] Appl. No.: **635,194**

[22] Filed: **Dec. 28, 1990**

[51] Int. Cl.⁵ **B65B 53/00**

[52] U.S. Cl. **428/34.9; 428/500; 428/516; 525/240**

[58] Field of Search **428/500, 516, 34.9; 525/240**

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Primary Examiner—Edith L. Buffalow
Attorney, Agent, or Firm—C. L. Bell; Myron B. Kurtzman

[57] ABSTRACT

A thermoplastic film is provided which is especially suited for use in stretch/cling applications such as, for example, the bundling, packaging and unitizing of foods and other goods. The film comprises a cling layer comprising a polyethylene, preferably low density polyethylene (LLDPE) and a compatible tackifier. The LLDPE has a density of from about 0.87 to about 0.92 g/cc, a melt index of from about 1 to about 30 dg/min and a ratio of weight average molecular weight to number average molecular weight (M_w/M_n) less than about 6. The blend has a glass transition temperature of about 0° C. or less. The film may be a one-sided cling film having a polyolefin slip layer opposite the cling layer.

7

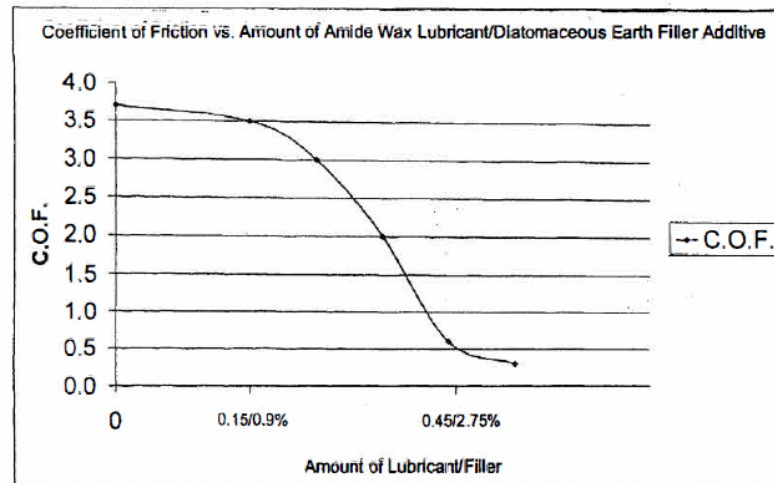
wide ranging melt flow rates of from about 0.1 to about 300 dg/min. As is known, such polypropylene is normally crystalline with a density range of from about 0.89 to about 0.91 g/cc. Such polypropylene and methods for making the same are well-known in the art and are readily available commercially. 5

Additionally, the non-cling layer may include one or more anticling (slip and/or antiblock) additives which may be added during the production of the polyolefin or subsequently blended in to improve the slip properties of this layer. Such additives are well-known in the art and include, for example, silicas, silicates, diatomaceous earths, talcs and various lubricants. These additives are preferably utilized in amounts ranging from about 100 ppm to about 20,000 ppm, more preferably between about 500 ppm to about 10,000 ppm by weight based upon the weight of the slip layer. 10 15

2005: CIPP Liners with Slip Additives

U.S. Pub. No. 2005/0194718 A1 (Blades) – CIPP Liner (EX1013)

(19) United States	
(12) Patent Application Publication	(10) Pub. No.: US 2005/0194718 A1
Blades et al.	(43) Pub. Date: Sep. 8, 2005
(54) PIPE LINERS AND METHOD OF LINING PIPES	(30) Foreign Application Priority Data
	Feb. 17, 2004 (GB)..... 0403472.4
(76) Inventors: David John Blades, Sheffield (GB); Robert Jan Wiessner, Bladel (NL)	Publication Classification
Correspondence Address: GOODWIN PROCTER L.L.P. 103 EISENHOWER PARKWAY ROSELAND, NJ 07068 (US)	(51) Int. Cl.7 B29C 31/00; F16L 55/16
	(52) U.S. Cl. 264/269; 138/98
(21) Appl. No.: 11/060,269	(57) ABSTRACT
(22) Filed: Feb. 17, 2005	Provided herein are exemplary embodiments of novel and nonobvious liners, methods of lining passageways or pipelines using said liners, and uses of said liners. In one embodiment of the present invention, the liner comprises a resin absorbent material and a substantially impermeable coating. The substantially impermeable coating includes a modified polymer including a polymer having at least one additive incorporated thereto; wherein the dynamic coefficient of friction of the modified polymer is lower than the coefficient of friction of the polymer
Related U.S. Application Data	
(60) Provisional application No. 60/552,177, filed on Mar. 10, 2004.	



(EX1013, Cover, ¶¶71-72, 75; Pet., 8.)

[0071] There are two main types of lubricants suitable for forming the modified polymers forming the substantially impermeable polymer coating(s) of the liner of an embodiment of the present invention; these are designated **external lubricants and internal lubricants**.

[0072] The former have only a limited degree of compatibility with the polymer and thus **tend to migrate towards the surface of the polymer**. As such, **external lubricants** tend to improve the surface appearance and gloss of polymers, in addition to **reducing the COF of the polymer**. Internal lubricants, on the other hand have a high degree of com-

[0074] It is well understood by those skilled in the art that various classes of lubricants may demonstrate both **internal and external lubricity**, depending on the type of polymeric substance the lubricant is added to and the processing temperatures.

[0075] **Suitable lubricants** for use in forming the modified polymers of the present invention include **natural waxes** and oils, for example paraffins; **synthetic waxes** and oils, for example polyethylene and oxidized polyethylene waxes; monoamides, bisamides, and alkanolamides, such as oleamide and erucamide, **ethylene bis-stearamide (EBSA)** and **ethylene bis-oleamide (EBOA)**. All of the aforementioned are predominately external lubricants.

2008: Inventor Dr. Stark (and Hummel) Knew of Slip Additives

U.S. Pub. No. 2011/0083765 (Stark + Hummel) – Film for CIPP Liners (EX1011)

(19) **United States**

(12) **Patent Application Publication**
STARK et al.

(10) Pub. No.: **US 2011/0083765 A1**
(43) Pub. Date: **Apr. 14, 2011**

Inventors: **KURT STARK**, Neuhaus (DE);
HENDRIK HUMMEL,

(54) **UV LIGHT AND PROTECTIVE FILM**

(75) Inventors: **KURT STARK**, Neuhaus (DE);
HENDRIK HUMMEL,
FORSCHHEIM (DE); **MANFRED**
RÜBNER, FORSCHHEIM (DE)

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GMBH & CO, FORCHHEIM (DE)

(21) Appl. No.: **12/873,932**

(22) Filed: **Sep. 1, 2010**

Related U.S. Application Data

(63) Continuation of application No. PCT/EP2009/
008845, filed on Dec. 10, 2009.

(30) Foreign Application Priority Data

Dec. 17, 2008 (DE) 102008062407.1
Sep. 18, 2009 (DE) 102009041841.5

Publication Classification

(51) **Int. Cl.**
F16L 55/162 (2006.01)
C08L 23/02 (2006.01)
C08L 23/26 (2006.01)
C08K 5/29 (2006.01)

C08K 5/3417 (2006.01)

C08K 3/22 (2006.01)

C08K 5/357 (2006.01)

C08K 5/07 (2006.01)

C08K 5/18 (2006.01)

C08K 5/134 (2006.01)

C08K 5/3475 (2006.01)

B32B 27/20 (2006.01)

B32B 27/32 (2006.01)

B32B 27/08 (2006.01)

(52) **U.S. Cl.** **138/97**; 524/528; 524/570; 524/236;
524/94; 524/430; 524/431; 524/401; 524/96;
524/359; 524/186; 524/291; 524/91; 428/500;
428/476.3; 428/515; 428/520

(57) **ABSTRACT**

A contact transparent single layer or multilayer film absorbing and/or reflecting UV radiation and short-wavelength visible light is disclosed. The film comprises at least one layer based on at least one optionally modified thermoplastic olefin homo- or co-polymer, comprising a combination of at least one organic or inorganic colored pigment or dye absorbing and/or reflecting short-wavelength visible light, and of at least one organic or inorganic compound absorbing and/or reflecting the UV radiation. The film disclosed herein can be used as a protective film against the effects of UV radiation and short-wavelength visible light, and a sewer cleaning system comprising said multilayer film as an external hose film and an inner, multilayer plastic film, and an impregnated UV-curable carrier material present between the two hose films

[0090] Each of the layers of the internally lying film tube may also, if necessary, respectively independently of one another be provided with additives selected from the group comprising antioxidants, antiblocking agents, antifogging agents, antistatics, antimicrobial active agents, heat stabilizers, process stabilizers, process auxiliaries, flameproofing agents, nucleation agents, crystallization agents, preferably crystal nucleation agents, lubricants, flexibilizing agents, sealing agents, plasticizers, silanes, spacers, fillers, peel additives, waxes, wetting agents, surface-active compounds, preferably surfactants, and dispersants.

(EX1011, Cover, ¶90; Pet., 9.)

Claim Construction is Unnecessary

Claim 1 of the '882 Patent

US 9,657,882 B2

19

3. Determination of the Coefficients of Friction

The following coefficients of friction (COF) were measured in the tubular films of comparative example V1 and of examples B1-B6, where one external side of one film was measured against the one of another film:

Comparative example V1: mean 0.31; PA side vs. PA side; Example B1: mean 0.25; polysiloxane-coated sides against one another;

Example B2: mean 0.27; polysiloxane-coated sides against one another;

Example B3: mean 0.245; polysiloxane-coated sides against one another;

Example B4: mean 0.24; wax-additivated sides against one another;

Example B5: mean 0.16; wax-additivated sides against one another;

Example B6: mean 0.14; wax-additivated sides against one another.

It is immediately obvious from these results that both a coating with polysiloxane (so-called silicization) and an additivation with substances migrating to the surface reduce the coefficient of friction COF. It is in trenchless sewage pipe renovation where low COFs are always advantageous, as then the tube liners can be more easily drawn into the pipe.

4. Air Inflation Test, Splicing and Break

Example	Initial circumference in mm	Splice in mm	Splice in %	Break in mm	Break in %
V1	1054	1222	15.9	1902	80.5
B1	1044	1220	17.9	2100	96.4
B2	1042	1280	22.8	2170	109.3
B3	1050	1250	19.0	2100	100.0
B4	1050	1229	17.0	1985	89.0
B5	1052	1245	18.3	2016	91.6
B6	1050	1243	18.4	2025	92.9

A surprising finding was that the elasticity until break increased significantly with coating with polysiloxane and wax additivation compared to the non-silicized reference that was not additivated with wax from comparative example V1. In the polysiloxane-coated tubular film from example B3, the increase in elasticity until break compared to the reference from comparative example V1 is 3.1%, in example B2 even almost 7%.

Another clear improvement is also seen in the elasticity until break. Whereas comparative example V1 breaks already under an elongation of 80.5%, the polysiloxane-coated tubular film from example B1 can elongate 96.4% (15.9% more than V1), and in the case of the polysiloxane-coated tubular film from example B3 the elongation is 100.0% (19.5% more than the reference V1). The improvement of the elongation until break becomes clearest in the tubular film coated with polysiloxane from example B2, where the elongation until break is 109.3%—even 27.8% greater compared to the reference V1.

Additivation with wax also causes a noticeable increase in tubular film elasticity until film splice and film break, as the comparison of examples B4-B6 with the non-additivated film from comparative example V1 shows. Anyhow, the addition of 6% wax (example B6) increases elasticity until film splice by up to 2.5% compared to the film from comparative example V1. Film elongation until break improves by more than 12% in the film of example B6 compared to the film from comparative example V1 (in example 4: 8.5%, in example 5: 11.1%).

20

Silicization in both sides of a tubular film (laid flat) significantly increases elasticity until splicing or break. Additivation with wax leads to noticeable improvements too.

A possible cause for this surprising and positive effect with regard to the mechanical properties of the tubular film according to the invention can be an additional protective effect of the external polyamide layer owing to a thin polysiloxane film (due to coating) and also to a thin wax film (due to migration to the surface). The two variants—coating with a polysiloxane ("silicization") and wax additivation—lead to a hydrophobic, water-repellent protective layer on the external side of the tubular film.

The invention was explained using a few embodiments, but is not restricted to them. Invention variations are readily possible as part of the claims.

1. An insertion tube for use in trenchless sewage pipe renovation, comprising:

an opaque external tubular film that is impermeable to liquids and at least partially reflects or absorbs UV radiation or visible light of short wavelengths;

an inner tubular film;

a carrier material impregnated with a reactive plastic resin arranged between the external tubular film and the inner tubular film; and

wherein the inner tubular film comprises: one or multiple layers

an inner facing external side and an outer facing external side facing the carrier material;

a coating of at least one of (1) a coating with a polysiloxane; or (2) a coating or covering with at least one migrating compound; and

wherein the coating is applied over a section of or an entire circumferential area of the outer facing external side facing the carrier material.

2. The insertion tube according to claim 1, wherein the coating is applied to a section of the circumferential area of the outer facing external side as continuous or interrupted stripes, or continuously covering laying edges running along the tubular film.

3. The insertion tube according to claim 1, the inner tubular film further comprising a layer that contains a thermoplastic elastomer (TPE) within a range of more than 20% by weight up to 100% by weight.

4. The insertion tube according to claim 1, wherein the inner tubular film has a total thickness between 10 µm and 5000 µm.

5. The insertion tube according to claim 1, the inner tubular film further comprising at least one internal layer in the form of an adhesion promoter layer, wherein at least one of the external layers comprising the coating, and wherein: one of the external layers has at least one homo- and/or copolyamide and the other external layer has at least one thermoplastic olefin homo- or copolymer with a proportion by weight expressed in percent of more than 25% by weight, or

both external layers contain at least one thermoplastic olefin homo- or copolymer, and there is one internal layer containing a homo and/or copolyamide with a proportion by weight expressed in percent of more than 25% by weight.

6. The insertion tube according to claim 5, the inner tubular film further comprising an additional internal layer comprising one of:

an EVOH layer; a barrier material against oxygen, water vapor, or oil; or

1. An insertion tube for use in trenchless sewage pipe renovation, comprising:

an opaque external tubular film that is impermeable to liquids and at least partially reflects or absorbs UV radiation or visible light of short wavelengths;

an inner tubular film;

a carrier material impregnated with a reactive plastic resin

arranged between the external tubular film and the inner tubular film; and

wherein the inner tubular film comprises:

one or multiple layers

an inner facing external side and an outer facing external side facing the carrier material;

a coating of at least one of (1) a coating with a polysiloxane; or (2) a coating or covering with at least one migrating compound; and

wherein the coating is applied over a section of or an entire circumferential area of the outer facing external side facing the carrier material.

(EX1001, 13.)

Claim 1

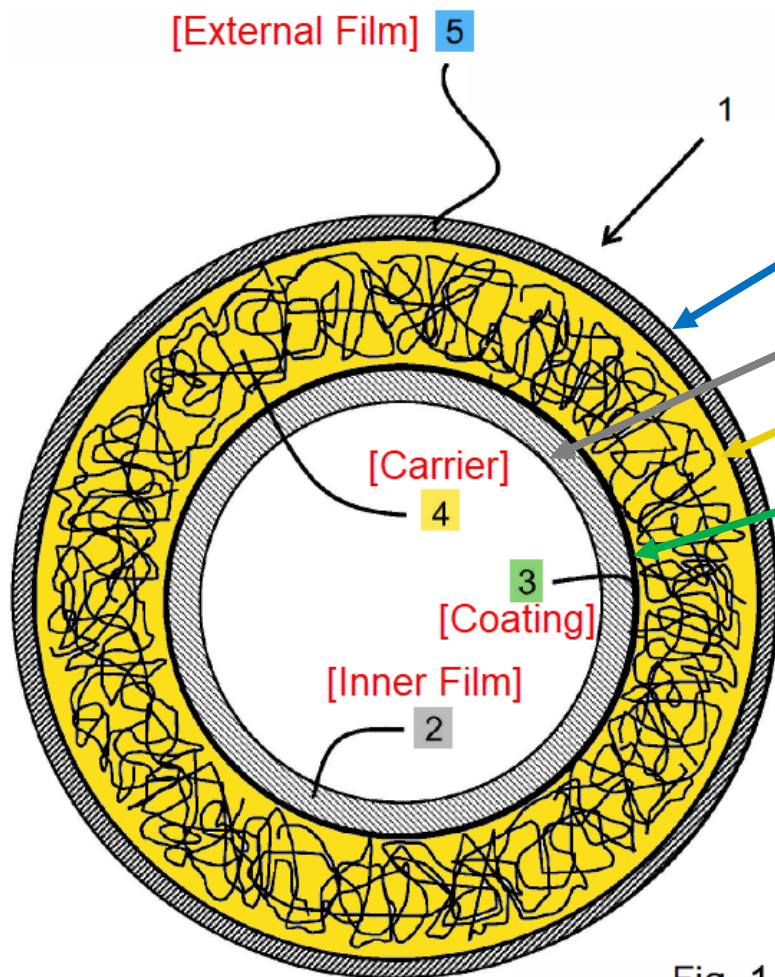


Fig. 1

1. Opaque External Tubular Film (5)

2. Inner Tubular Film (2)

3. Carrier Material + Reactive Plastic Resin (4)

4. a coating (3) of at least one of (1) a coating with a polysiloxane; or (2) a coating or covering with at least one migrating compound

- wherein **the coating is applied over** a section of or an entire circumferential area of the outer facing **external side** facing the carrier material.

“The Coating is Applied Over ... External Side”

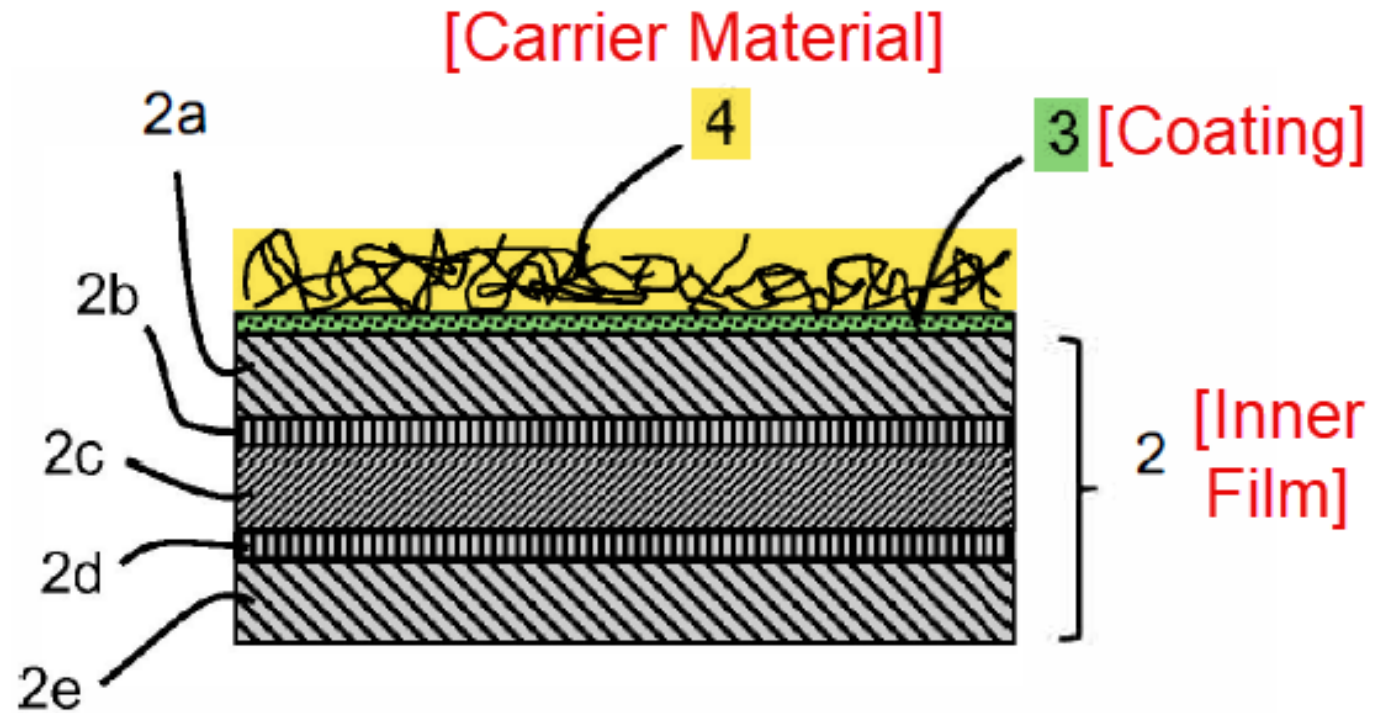


Fig. 2

"Coating" – Institution Decision

IPR2023-01372
Patent 9,657,882 B2

that appear in claim 1. Even on this preliminary record, we have concerns about whether a migrating compound *incorporated into* an inner tubular film is “a coating or covering” of that film within the scope of claim 1. *See id.* at 30 (citing Ex. 1003 ¶ 134) (Petitioner’s reliance on extrinsic evidence to show that waxes migrate to the surface of the inner tubular film and, thereby, create “a ‘coating’” on that structure). To the contrary, claim 1 expressly requires that “the coating is *applied over* a section or an entire circumferential area of the outer facing external side” of the inner tubular film. Ex. 1001, 20:34–36 (Board’s emphasis).

We need not resolve that issue, however, for purposes of deciding whether to institute review. *See Nidec Motor Corp.*, 868 F.3d at 1017. Petitioner proposes two grounds that do not depend on a finding that a migrating compound *incorporated into* a film is “a coating or covering” as specified in claim 1, but instead are based on prior art that allegedly teaches a migrating compound *applied over* a film to satisfy the second, alternative prong of Petitioner’s proposed definition. Ex. 1001, 20:32; *see* Pet. 42–44, 55–57 (proposing that a coating containing a wax, as disclosed in Schuhmann or Nagai, would have been applied over the external surface of Hummel’s insertion tube).

C. The Patentability Challenges

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person of ordinary skill in the art to which the subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). We apply that standard to assess whether Petitioner shows sufficiently for purposes of trial institution that at least one challenged claim is unpatentable.

that appear in claim 1. Even on this preliminary record, we have concerns about whether a migrating compound *incorporated into* an inner tubular film is “a coating or covering” of that film within the scope of claim 1. *See id.* at 30 (citing Ex. 1003 ¶ 134) (Petitioner’s reliance on extrinsic evidence to show that waxes migrate to the surface of the inner tubular film and, thereby, create “a ‘coating’” on that structure). To the contrary, claim 1 expressly requires that “the coating is *applied over* a section or an entire circumferential area of the outer facing external side” of the inner tubular film. Ex. 1001, 20:34–36 (Board’s emphasis).

(ID, 8:1-8.)

8

"Covering" Not Used to Describe Migration to Surface

- **Specification:** Consistently describes a "coating" as formed by migration to the surface. (EX1001, 5:23-26, 5:27-30, 17:29-30, 18:64-67; Pet. Reply, 22.)
 - Never describes migration to surface as forming only a "covering."
 - Only differentiates a "coating" and "covering" as being a matter of *preferred minimum thickness* (5 nm v. 0.1 μm); maximum thickness same (3 μm). (EX1001, 7:6-10; Pet. Reply, 22.)
- **Lawsuit:** PO has consistently argued a "coating" is formed by migration to the surface. (EX1033, ¶¶15, 40; EX1035, 11; EX1037, ¶¶15, 40; EX1039, 6; EX1054, 18; Pet. Reply, 22.)
- **PO's Expert:** PO's expert testified that "covering" is "a type of coating." (EX2001, ¶25; Pet. Reply, 22.)

PO's Construction Creates Indefiniteness

- **Unclaimed process step** of migrating the compound to the surface after manufacture.
(Pet. Reply, 22-23.)
- Migration is **time and temperature dependent** making infringement unpredictable.
(EX1001, 5:26-27, 18:19-23; Pet. Reply, 24.)
- Claim 1 has **no minimum amount or thickness** of “migrating compound.” (Pet. Reply, 23-24.)
- PO claims an **undefined “small amount of migrating compound”** is neither a coating nor a covering. (POR, 21; Pet. Reply, 23-24.)

Claim Construction is Unnecessary

- Hummel + Schuhmann (or Nagai) teach all limitations of Challenged Claims under any construction. (Pet., 25-63; Pet. Reply, 1.)
- PO's contorted claim construction is litigation driven to assert infringement by excluding "covering" from the "coating ... applied over." (Pet. Reply, 1, 21-22.)

Challenged Claims Are Obvious

Petitioner's Grounds 1-4

Ground	Claims	Prior Art	Statutory Basis
1	1, 4-7, 10-11	Hummel	§ 102(b)
2	3	Hummel	§ 103
3	1, 3-7, 10-13	Hummel + Schuhmann (Stark)	§ 103
4	1, 3-7, 10-11	Hummel + Nagai	§ 103

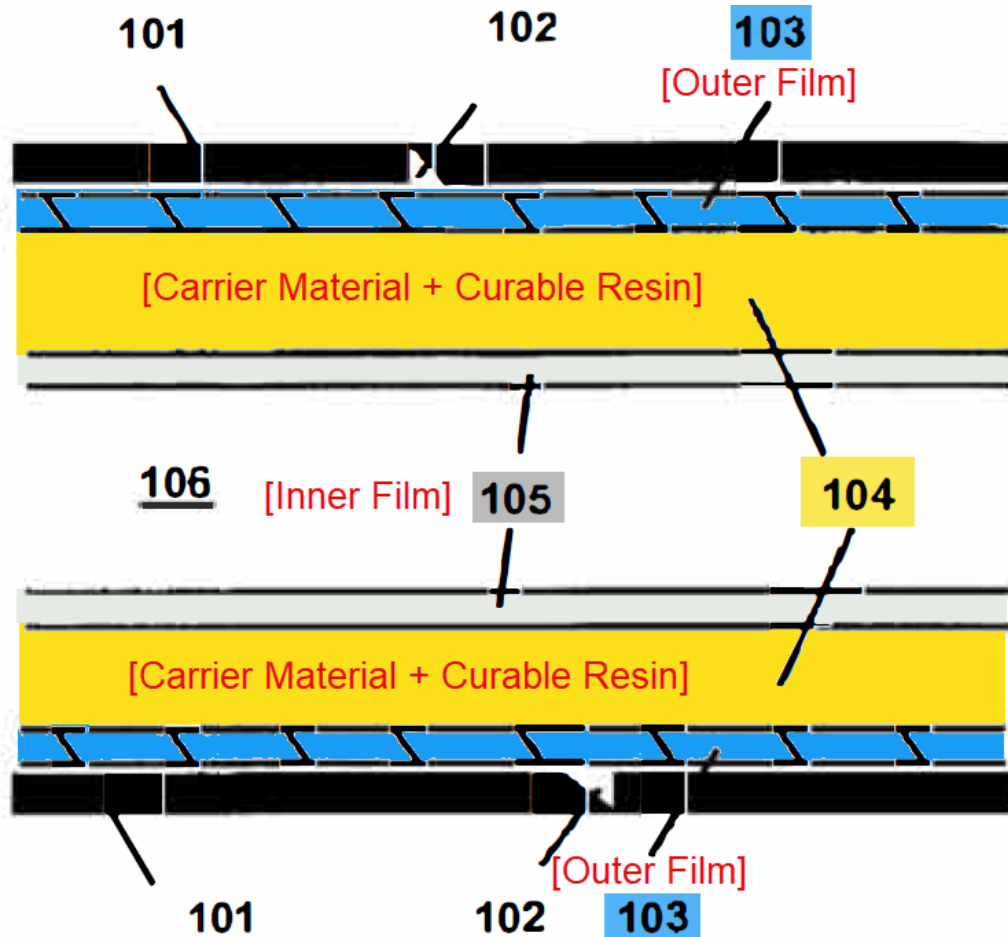
(Pet., 24.)

Hummel + Schuhmann

Claims 1, 3-7, 10-13 ("Challenged Claims") Are Obvious Over Hummel (EX1005) in View of Schuhmann (EX1007)

Hummel Teaches Claimed CIPP Liner Structure

Hummel



(EX1005, Fig. 1, 5, 15; Pet., 25-27.)

Claim 1

1. An insertion tube for use in trenchless sewage pipe renovation, comprising:
- an opaque external tubular film that is impermeable to liquids and at least partially reflects or absorbs UV radiation or visible light of short wavelengths;
 - an inner tubular film;
 - a carrier material impregnated with a reactive plastic resin arranged between the external tubular film and the inner tubular film; and
- wherein the inner tubular film comprises:
- one or multiple layers
 - an inner facing external side and an outer facing external side facing the carrier material;

(EX1001, 20:18-30.)

Hummel Teaches Removable Inner Film

WO 2011/157356

12

PCT/EP2011/002685

A further object of the present invention is an insertion tube suitable for the repair of underground pipes, preferably underground sewer pipes comprising a liquid-tight preferably non-conditioned multilayer film according to the invention, preferably in the form of a tubular film, as an inner tube, and a liquid-tight outer single-layer or multilayer tubular film absorbing and/or reflecting UV radiation and/or short-wave visible light as an outer tube, and a carrier material impregnated with a reactive plastic resin lying between the two tubes. After curing, the repaired sewer pipe is formed from this impregnated carrier material. After curing, the multilayer film according to the invention, preferably in the form of a tubular film, is preferably pulled off or out as an inner tube from the repaired sewer pipe formed from cured plastic and carrier material, but can alternatively also be left in the repaired pipe.

repaired sewer pipe is formed from this impregnated carrier material. After curing, the multilayer film according to the invention, preferably in the form of a tubular film, is preferably pulled off or out as an inner tube from the repaired sewer pipe formed from cured plastic and carrier material, but can alternatively also be left in the repaired pipe.

The manufacture of such insertion tubes is known to the skilled person, for example, from WO 2007/054350 A1 or EP-B 1 155 256.

Fig. 1 shows an example of a longitudinal section through an insertion tube (107) according to the invention after insertion into a tube (101) having an area (102) to be repaired. The insertion tube comprises a liquid-tight, UV radiation and/or short-wave visible light absorbing and/or reflecting outer single- or multilayer tubular film as an outer tube (103) and a liquid-tight preferably non-conditioned multilayer film according to the invention, preferably in the form of a tubular film, as an inner tube (105) and a carrier material (104) impregnated with a reactive plastic resin therebetween. After the insertion tube (107) has been inflated to the diameter of the tube (101), the insertion tube (107) has a cavity (106) into which a UV radiation and/or short-wave, visible light-emitting, preferably movable source, preferably a UV lamp, can be introduced, which causes the carrier material (104) impregnated with a reactive plastic resin to cure. The repaired pipe (108) is formed from this impregnated carrier material (104) after curing and, if necessary, after removal or extraction of the internal tube (105).

cure. The repaired pipe (108) is formed from this impregnated carrier material (104) after curing and, if necessary, after removal or extraction of the internal tube (105).

(EX1005, 15:7-10, 15:23-24; Pet. 17, 27-29, ; Pet. Reply, 4, 24.)

Hummel Teaches Use of Slip Additives

WO 2011/157356

8

PCT/EP2011/002685

Particularly preferably, layers (c) and (e) each have the same polyamide.

The layers (c) and (e) of the multilayer film according to the invention preferably each have a layer thickness of 5 μm to 100 μm , particularly preferably of 10 μm to 60 μm , independently of one another.

Conventional adhesion promoters can be used to produce the adhesion promoter layers (b) and (d) of the multilayer film according to the invention. Preferably, the adhesion promoter layers (b) and (d) are each independently based on at least one modified thermoplastic polymer, preferably on at least one modified olefin homo- or copolymer. The olefin homo- or copolymers used may be the same olefin homo- or copolymers that are suitable for the production of layer (a), except that they are modified. Particularly preferably, the adhesion promoter layers (b) and (d) are each based independently on at least one modified ethylene homo- or copolymer and/or at least one modified propylene homo- or copolymer modified with at least one organic acid or at least one preferably cyclic organic acid anhydride, preferably with maleic anhydride.

The adhesion promoter layers (b) and (d) of the multilayer film according to the invention preferably each have a layer thickness of 1 μm to 30 μm , particularly preferably of 2 μm to 20 μm , independently of one another.

The layers (a), (c) and (e) and the adhesion promoter layers (b) and (d) of the multilayer film according to the invention can, if necessary, in each case independently of one another, be treated with additives selected from the group comprising antistatic agents, antioxidants, ant blocking agents, antifogging agents, antimicrobial agents, dyes, color pigments, stabilizing agents, preferably heat stabilizers, process stabilizers, processing aids, flame retardants, nucleating agents, crystallizing agents, preferably crystal nucleating agents, lubricants, optical brighteners, flexibilizers, sealing agents, plasticizers, silanes, spacers, fillers, peel additives, waxes, wetting agents, surface-active compounds, preferably surfactants, and dispersants, provided that such additives do not impair UV transmission.

The layers (a), (c) and (e) and the adhesion promoter layers (b) and (d) of the multilayer film according to the invention can, if necessary, in each case independently of one another, be treated with additives selected from the group comprising antistatic agents, antioxidants, ant blocking agents, antifogging agents, antimicrobial agents, dyes, color pigments, stabilizing agents, preferably heat stabilizers, process stabilizers, processing aids, flame retardants, nucleating agents, crystallizing agents, preferably crystal nucleating agents, lubricants, optical brighteners, flexibilizers, sealing agents, plasticizers, silanes, spacers, fillers, peel additives, waxes, wetting agents, surface-active compounds, preferably surfactants, and dispersants, provided that such additives do not impair UV transmission.

(EX1005, 11:18-25; EX1003, ¶¶127-130, 133; Pet., 27-30.)

The layers (a), (c) and (e) and the adhesion promoter layers (b) and (d) of the multilayer film according to the invention may, if necessary, each independently contain at least 0.01-20% by weight, preferably at least 0.1-10% by weight, in each case based on the total weight of a single layer, of at least one of the above additives.

(EX1005, 12:1-4; Pet., 32; Pet. Reply, 9, 25.)

Schuhmann Teaches a “Coating” Under Any Construction

WO 2011/054434

2

PCT/EP2010/006243

According to the invention, this task is solved by providing a tacky product provided with a removable release and/or a protective film, wherein the release film comprises at least one layer (a) based on at least one thermoplastic polymer having on at least one of its surfaces a finish based on at least one lipophilic compound having at least to the extent of an embossed structure with which it is in contact with the tacky surface of the product.

Indeed, it was surprisingly found that by using a release film comprising at least one layer (a) based on at least one thermoplastic polymer, which has at least on one side as a finish a coating or covering based on at least one lipophilic compound with at least one partial embossed structure, an improvement in the release effect of adhesive products can be achieved compared to conventional release films.

For the purposes of the present invention, the term “finish” is to be understood to mean that the layer (a) of the release film used according to the invention has, at least on one side, a coating or covering based on at least one lipophilic compound. The layer (a) may be coated on one side with the lipophilic compound or have occupancy on at least one of its surfaces by at least one migrated lipophilic compound. This surface thus finished has at least partially an embossed structure, which may be present throughout the thickness of layer (a) or even through the total thickness of the release film with decreasing thickness, depending on how strongly the embossing has been carried out.

In a preferred embodiment, the layer (a) of the release film has a one-sided coating, i.e. an outer layer in contact with the adhesive product based on at least one lipophilic compound as a finish, which has at least one embossed structure, preferably at least to the extent of contact with the adhesive product.

For the purposes of the present invention, the term “finish” is to be understood to mean that the layer (a) of the release film used according to the invention has, at least on one side, a coating or covering based on at least one lipophilic compound. The layer (a) may be coated on one side with the lipophilic compound or have occupancy on at least one of its surfaces by at least one migrated lipophilic compound. This surface thus finished has at least partially an embossed structure, which may be present throughout the thickness of layer (a) or even through the total thickness of the release film with decreasing thickness, depending on how strongly the embossing has been carried out. (EX1007, 5; Pet., 18.)

Preferably, the lipophilic compound has a molecular weight of $\leq 10\,000$ g/mol, preferably $\leq 5\,000$ g/mol, more preferably $\leq 2\,000$ g/mol, most preferably $\leq 1\,000$ g/mol.

A wax is preferably present as the lipophilic compound for achieving the required release effect of the release film used according to the invention. (EX1007, 6; Pet., 18; Pet. Reply, 25.)

Schuhmann Teaches Use of Constab PE-SA 270

WO 2011/054434

20

PCT/EP2010/006243

PP: Polypropylene Homopolymer
PE: Mixture of LDPE (Lupolen 2420 F) (80%) and HDPE (Hostalen GF 9045 F) (20%)

LV1: Constab PE-SA 270 (based on ethylene-bis-stearylamine (EBS))

II. Production of the release films

The release films of Comparative Examples V1a-V1b and Example B1 each consist of three layers and have a total layer thickness of 60 µm each. All release films of the above example and the above comparative examples were each produced by blown film co-extrusion. The release films of Comparative Example V1a and the Example B1 were then embossed on one side.

III. Examples and comparative examples and determination of the separation force

All subsequent % figures are in each case wt.-%. The separation force was determined according to the method described above.

Comparative examples 1a (V1a) and 1b (V1b) and example B1:

	V1a	V1b	B1
Layer structure	Layer (1) (20 µm): 100% PP; Layer (2) (20 µm): 100% PP; Layer (3) (20 µm): 100% PP	Layer (1) (20µm): 96% PP and 4% LV1; Layer (2) (20 µm): 100% PP; Layer (3) (20 µm): 96% PP and 4% LV1	Layer (1) (corresponds to Layer (a)) (20 µm): 96% PP and 4% LV1; Layer (2) (20 µm): 100% PP; Layer (3) (20 µm): 96% PP and 4% LV1
one-sided embossed structure	yes	no (smooth)	yes
Release film contains lipophilic compound	no	yes	yes

LV1:

Constab PE-SA 270 (based on ethylene-bis-stearylamine (EBS))

	V1a	V1b	B1
Layer structure	Layer (1) (20 µm): 100% PP; Layer (2) (20 µm): 100% PP; Layer (3) (20 µm): 100% PP	Layer (1) (20µm): 96% PP and 4% LV1; Layer (2) (20 µm): 100% PP; Layer (3) (20 µm): 96% PP and 4% LV1	Layer (1) (corresponds to Layer (a)) (20 µm): 96% PP and 4% LV1; Layer (2) (20 µm): 100% PP; Layer (3) (20 µm): 96% PP and 4% LV1
one-sided embossed structure	yes	no (smooth)	yes
Release film contains lipophilic compound	no	yes	yes

(EX1007, 23; Pet. Reply, 4.)

DEMONSTRATIVE EXHIBIT - NOT EVIDENCE

29

Inventor Dr. Stark is a Co-Inventor on Schuhmann

WO2011/054434 A1 (Schuhmann) (EX1007)

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- (81) Destination States (unless otherwise indicated, for each
available national IPR type): AE, AG, AL, AM, AO, AT,
AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL,
CN, CO, CR, CU, CZ, DK, DM, DO, DZ, EC, EE, EG, ES,
FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN,
IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR,
LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX,
MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT,
RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY,
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Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES,
FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK,
MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI
(BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR,
NE, SN, TD, TG).

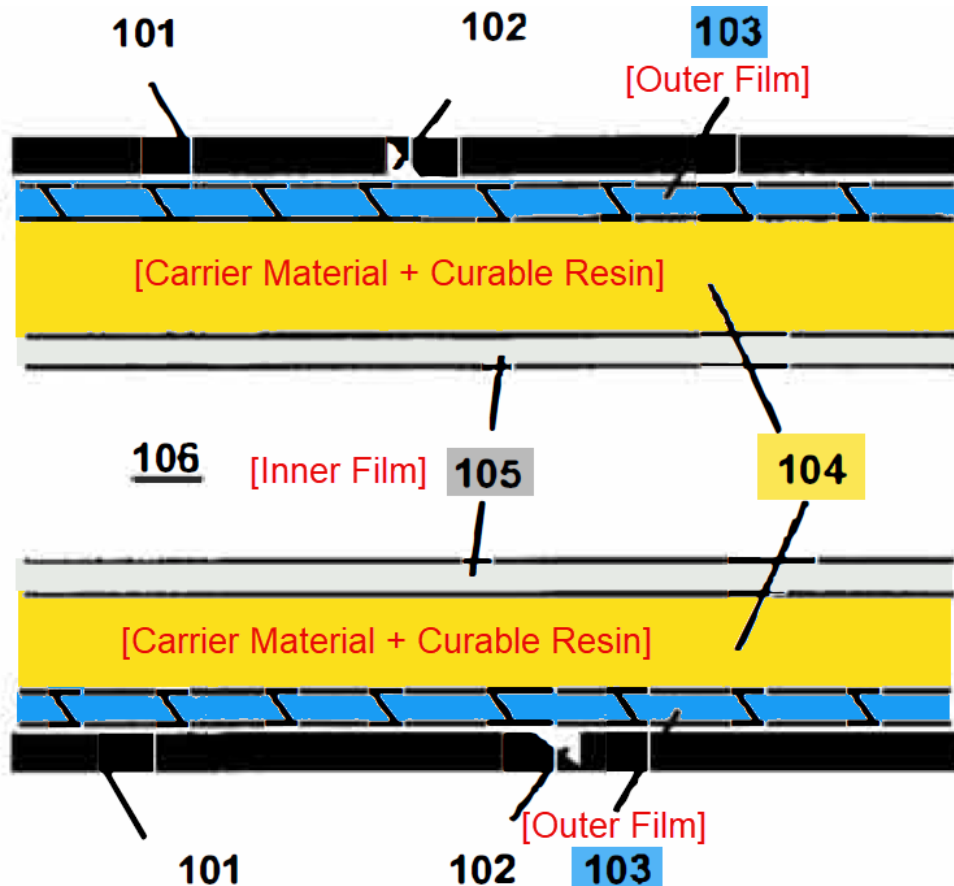
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(EX1007, 2.)

Hummel + Schuhmann = Claim 1

Hummel



(EX1005, Fig. 1, 5, 15; Pet., 25-27.)

Schuhmann

1. **"Applied Over"**: "The layer (a) may be coated on one side with the **lipophilic compound**." (EX1007, 4, 5; Pet., 18.)
2. **"Incorporated Into"**: "have occupancy on at least one of its surfaces by at least one migrated lipophilic compound." (EX1007, 5, 18; Pet., 18.)
 - **"Wax"** is the preferred "lipophilic compound". (EX1007, 4, 6; Pet. 18; Pet., Reply 4.)
 - **Constab® PE-SA 270** used, same as the '882 Patent. (EX1007, p. 23; EX1001, 15:15-18, 16:3-65; EX1051.)

PO Only Argues “Bodily Incorporation” and Hummel’s “Need”

- PO does not dispute that Hummel as modified by Schuhmann teaches all elements of the Challenged Claims. (POR, 45-53; PO Sur-Reply, 8-10; Pet. Reply, 3.)
- PO improperly **argues bodily incorporation** of Schuhmann into Hummel. (POR, 45-53; PO Sur-Reply, 8-10; Pet. Reply, 4, 5, 6, 8.)
 - *In re Keller*, 642 F.2d 413, 425 (C.C.P.A. 1981): “The test for obviousness is not whether the features of a secondary reference may be **bodily incorporated into the structure of the primary reference**. . . . Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.” (Pet. Reply, 4, 5, 6, 8.)
- PO improperly **ignores the combined teachings** of prior art focusing solely on Hummel. *Application of Wood*, 599 F.2d 1032, 1036 (C.C.P.A. 1979) (A POSITA’s knowledge is not limited to a single patent reference). (Pet. Reply, 2.)

Hummel Teaches “Tearing” and “Seizing” Problems

WO 2011/157356

4

PCT/EP2011/002685

Surprisingly, it was found that the multilayer film according to the invention is characterized by a sufficient barrier effect against drying of the resin used for pipe repair, and thus against loss, i.e. migration of monomers or remaining impregnating agent. It was also surprisingly found that the multilayer film according to the invention, in particular in the form of a multilayer tubular film, but also as a multilayer film sealed to form a tube, is characterized by very good mechanical properties, in particular by very good elasticity, so that it withstands the stresses occurring during the repair of underground pipes, in particular during inflation in the pipe system, during the preceding transport, the preceding storage and the insertion into the pipe to be repaired, and furthermore, after the resin has cured, can be peeled off from it without being torn, torn in or torn off. It was also surprisingly found that the multilayer film according to the invention exhibits the very good mechanical properties even without prior conditioning, so that a conditioning step is not required.

For the purposes of this invention, the term “tubular film” is understood to mean a multilayer film produced by (co)extrusion, preferably by blown film (co)extrusion, which does not have a sealing seam.

For the purposes of this invention, the term “UV radiation” is understood to mean electromagnetic radiation in a wavelength range of 200 to 400 nm.

The multilayer film according to the invention is at least partially permeable, preferably at least 80%, particularly preferably at least 90% permeable to UV radiation.

In a preferred embodiment, the multilayer film according to the invention is not only at least partially transparent to UV radiation, but also at least partially, preferably at least 80%, particularly preferably at least 90% transparent to short-wave visible light.

i.e. migration of monomers or remaining impregnating agent. It was also surprisingly found that the multilayer film according to the invention, in particular in the form of a multilayer tubular film, but also as a multilayer film sealed to form a tube, is characterized by very good mechanical properties, in particular by very good elasticity, so that it withstands the stresses occurring during the repair of underground pipes, in particular during inflation in the pipe system, during the preceding transport, the preceding storage and the insertion into the pipe to be repaired, and furthermore, after the resin has cured, can be peeled off from it without being torn, torn in or torn off. It was also surprisingly found that the multilayer film according to the

(EX1005, 7:3-10.)

WO 2011/157356

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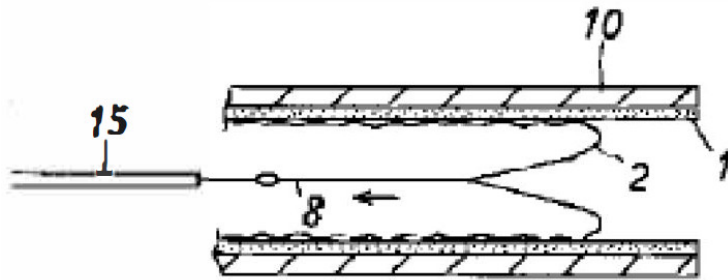
PCT/EP2011/002685

After curing, when the consolidated, repaired sewer pipe made of the cured carrier material is present, the multilayer film according to the invention, preferably in the form of a tubular film, can be peeled off as an inner tube, preferably without tearing or seizing therefrom.

(EX1005, 23:1-3.)

Nagai Teaches "Adhesion" and "Tearing" Problems

[0008]In addition, because the plastic film remained adhered to the resin absorbent material on the inner wall surface of the pipe, some of it gradually peeled off due to exposure to sewage, etc., and there was a possibility that the released pieces would clog the pipe.



[0016]In particular, in the present invention, thermally curable resin is impregnated into resin absorbent material 1 without adhering the thin film to the outer peripheral surface of resin absorbent material 1 by heating the thin film 2 or using an adhesive, etc. It is preferable to apply a release agent such as silicone, fluoridated oil, high melting point wax, fatty acid, or surfactant in advance to the inner circumferential surface of the thin film 2 or the outer circumferential surface of the resin absorbent material 1 to form a release layer between the resin absorbent material 1 and the thin film 2 so that the thermosetting resin does not function as an adhesive even after impregnating the resin absorbent material 1 with the liquid thermosetting resin.

[0029]
[Effects of Invention] As is clear in the explanation above, the tube lining material according to the present invention is covered with a thin film with a high airtightness around the perimeter of the resin absorbent material, and liquid-like curable resin is impregnated in the resin absorbent material without adhering to the outer surface of the resin absorbent material, so the thin film can be moved to the inner periphery side by inverting this in the pipe, and it can adhere to the inner wall of the pipe without slacking the resin absorbent material, so that a good quality hard film can be formed on the inner wall of the pipe, and since the thin film is pulled out from the pipe after curing of the resin absorbent material, there is no tearing of the thin film after construction as before, such as to clog the pipe.

Stark-Hummel Teaches “Sticking” and “Tearing” Problems

US2011/0083765 (Stark-Hummel) (EX1011)

[0072] To this end, the film must have not only sufficiently storage-stable mechanical properties so that it can withstand the stresses during handling of the sewer restoration tube, particularly during expansion by blowing in the sewer system, the preceding transport and the preceding storage, but also after curing of the plastic material in the carrier material to form the restoration pipe can be removed therefrom without ripping or tearing.

[0073] Furthermore, it is desirable to ensure that when the pipe formed by the plastic and the carrier material.

[0079] In order to satisfy the requirements of the problem-free handling of the internal tubular film during the sewer pipe restoration according to the tube lining technique, according to the invention an at least 3-layered plastic film is preferably used, which comprises a barrier layer, preferably an oxygen barrier layer, water vapor barrier layer and/or oil barrier layer, and the surface layer of which immediately next to the impregnated carrier material does not bond permanently, for example by tumescence and curing, to the liquid impregnation material to be cured, i.e. to the synthetic resin compound to be cured, but remains removable without tearing.

(EX1011, ¶¶0072, 0079, 0093, 0174, 0175; Pet. Reply, 2-3.)

[0093] By using the tube restoration system according to the invention, in particular owing to the internal tubular film as described above, the double-walled tube inserted into the sewer to be restored can be expanded by blowing without problems, i.e. without bursting, in order to achieve problem-free UV curing of the carrier material contained in the tube and impregnated with the liquid impregnation material. After curing, when the solidified restored sewer pipe consisting of the cured carrier material has been obtained, the internal tubular film can furthermore be removed from it without tearing or sticking.

[0174] The tubular film according to Example 3 could be removed again without difficulty after curing of the resin/carrier material and exhibited no mechanical damage. The multilayer film, however, was permanently bonded to the carrier material at some positions so that tearing of the film took place at such positions.

[0175] This risk of too intensive a bond of the polyamide layer of the multilayer film according to Comparative Example 5 with the cured resin also entails embrittlement and therefore mechanical damage to the internally lying tubular film and difficult removal of the tubular film after curing. Neither form of damage arises with the internally lying multilayer film in tubular form in a sewer restoration system according to the invention.

PO's Embossing Argument Fails Factually

- Hummel teaches that “[p]referably, the multilayer film according to the invention **can be embossed.**” (EX1005, 13:13; Pet. Reply, 5.)
- Schuhmann discloses **a non-embossed “smooth” release film** in Comparative Example V1b containing 4% Constab® PE-SA 270. (EX1007, p. 23; EX1001, 15:15-18, 16:3-65; EX1051; Pet. Reply, 5.)
- Schuhmann describes “point-shaped” embossing with heights as small as 5 μm —similar to the size of calcium carbonate particles in Constab® PE-SA 270. (EX1007, 15:1-30; EX1051; Pet. Reply, 5.)

POSITA Motivated to Combine Hummel + Schuhmann

- A POSITA would have been motivated to provide a **good release effect** to **prevent adhesion and/or tearing** of the inner film. (Pet., 40, 42-44.)
- A POSITA would have had a **reasonable expectation of success** using well-known techniques. (EX1003, ¶¶171-225; Pet. 40.)
- PO's claim that "Schuhmann is not at all concerned with 'curable' resin" contradicts **PO's failure to test with cured resin**, relying instead on tests with "adhesive tape." (POR, 58-59; PO Sur-Reply, 9; EX2004, ¶¶25, 44.)

Hummel + Nagai

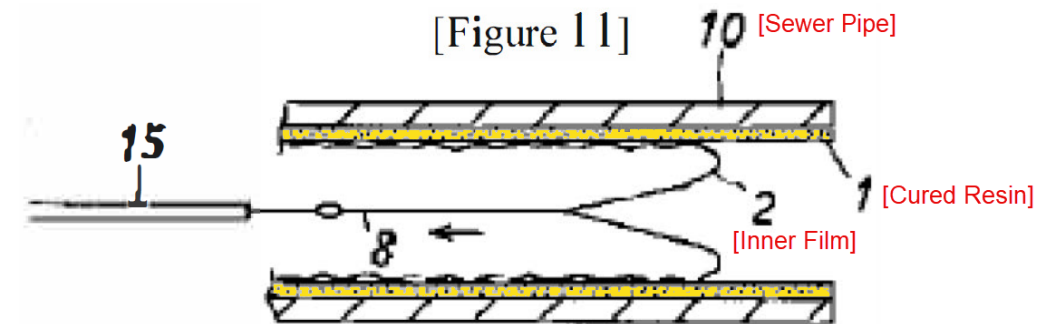
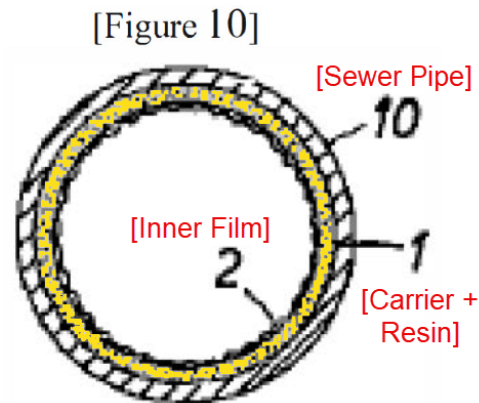
Claims 1, 3-7, 10-13 Are Obvious Over Hummel in View of Nagai

Nagai Teaches a CIPP Liner With a "Release Layer"

[0016]In particular, in the present invention, thermally curable resin is impregnated into resin absorbent material 1 without adhering the thin film to the outer peripheral surface of resin absorbent material 1 by heating the thin film 2 or using an adhesive, etc. It is preferable to apply a release agent such as silicone, fluorinated oil, high melting point wax, fatty acid, or surfactant in advance to the inner circumferential surface of the thin film 2 or the outer circumferential surface of the resin absorbent material 1 to form a release layer between the resin absorbent material 1 and the thin film 2 so that the thermosetting resin does not function as an adhesive even after impregnating the resin absorbent material 1 with the liquid thermosetting resin.

(EX1009, ¶¶16, 26, 27, Figs. 10, 11; Pet., 20-21, 55-58; Pet. Reply, 6-7.)

[0026]It should be noted that when the thermosetting resin is cured, the thin film 2 may adhere to the resin absorbent material 1 as an adhesive layer, but in this case as in Fig. 11, this can be easily peeled by pulling while inverting the thin film 2 along the conduit 10. Here, while Figure 11 shows an example of using a hot water hose 15 for peeling the thin film 2, a rope or other flexible wire material may be used instead to connect this together with the hot water hose 15 to one end seal 8 of the thin film 2 prior to inversion of the tube lining material L.



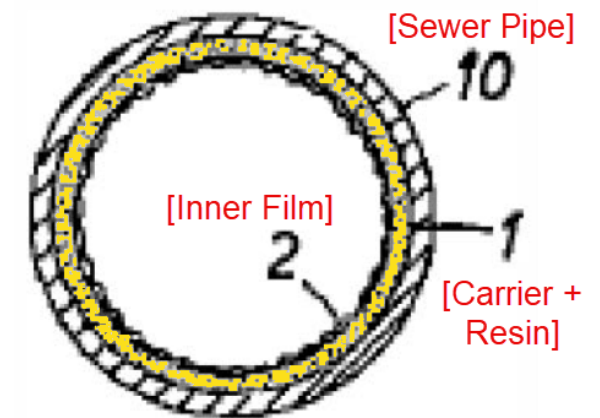
[0027]In addition, by applying a release agent in advance to the inner circumferential surface of thin film 2 and the outer circumferential surface of resin absorbent material 1 as described above, and forming a release layer between them, adhesion of thin film 2 and resin absorbent material 1 due to curing of thermosetting resin can be completely prevented, so in this case, the connection side of the cap 12 shown in Fig. 9 can be pulled directly from the conduit 10 without the use of hot water hose 15 or other wire material.

Nagai Teaches Use of UV Resin and Inflation

[0012]Moreover, this resin absorbent material 1 is impregnated by a method as described below in which uncured curable resin is kept in a liquid form of about 5 to 10 kg per square meter. As the curable resin, photocurable resins (ultraviolet cured resins) that add photosensitizers such as benzofluenone to acrylates and epoxy compounds can be used, but in the present example, thermocurable resins such as unsaturated polyester resins, epoxy resins, or urethane resins may be used.

[0022]Here, the tube lining material L is firmly adhered to the inner wall surface of the conduit 10 while under a large hydraulic pressure from the large diameter part 12B side of the mouthpiece 12, but preferably combined with air pressure to further increase the inner pressure of the tube lining material L. Specifically, as shown in FIG. 9, a pressure cap 17 pierced through the hot water hose 15 is attached to the top opening of the mouthpiece 16 to form a sealed space S on the water surface of the extension tube 14 and to supply compressed air within that sealed space S from compressor C through the pressure cap 17, which forces the tube lining material L to the inner wall of the tube 10 with water pressure and air pressure.

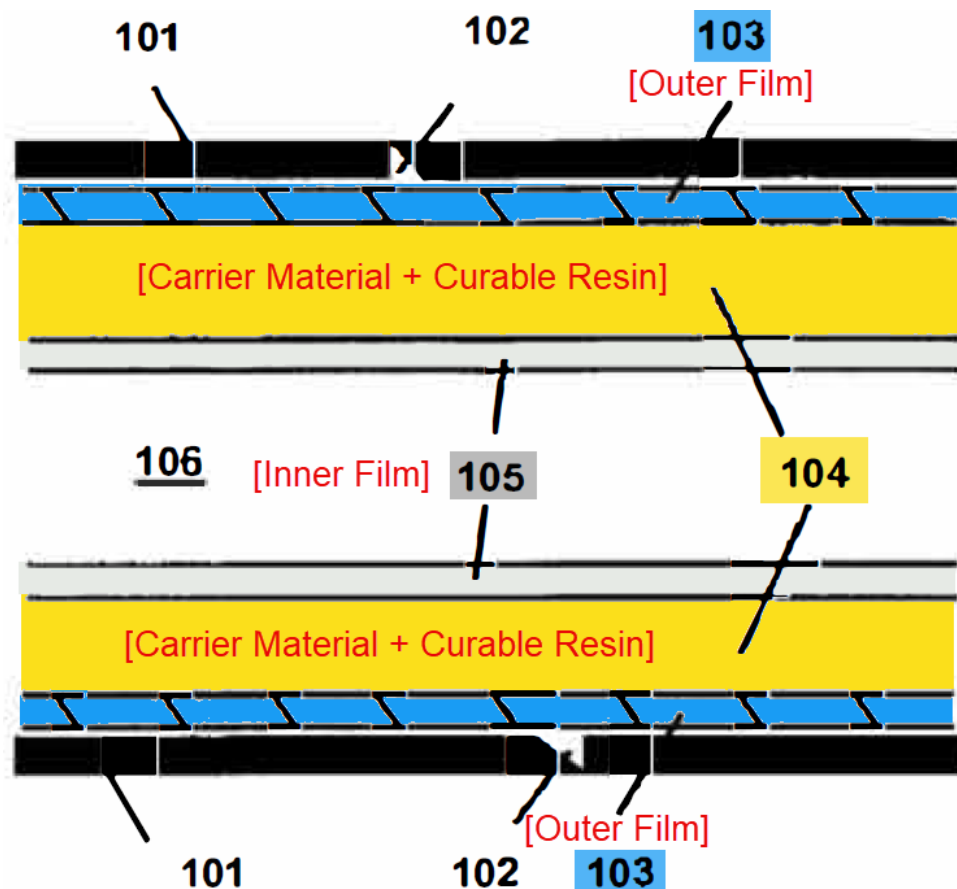
[Figure 10]



(EX1009, ¶¶12, 22, Fig. 10; Pet., 21; Pet. Reply, 8.)

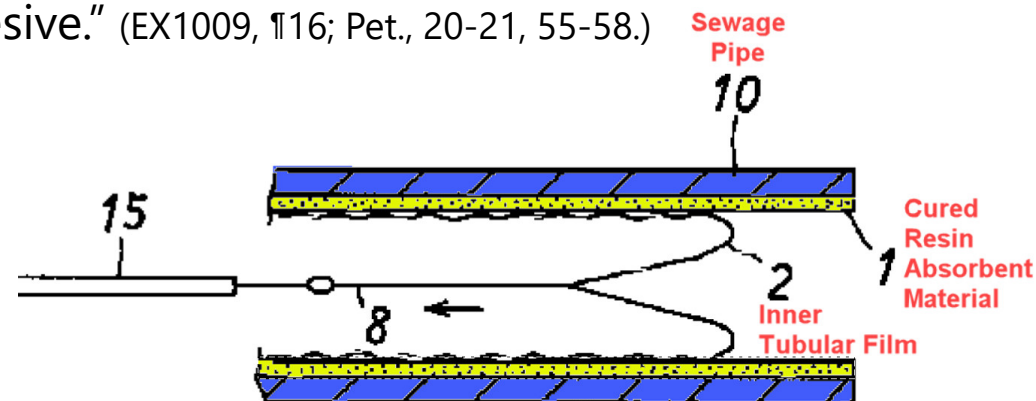
Hummel + Nagai = Claim 1

Hummel



Nagai

"It is preferable **to apply a release agent** such as **silicone**, fluoridated oil, high melting point **wax**, fatty acid, or **surfactant** in advance **to the inner circumferential surface of the thin film 2** or the outer circumferential surface of the resin absorbent material 1 **to form a release layer** between the **resin absorbent material 1** and the **thin film 2** so that the thermosetting resin does not function as an adhesive." (EX1009, ¶16; Pet., 20-21, 55-58.)



(EX1005, Fig. 1, 5, 15; Pet., 25-27.)

DEMONSTRATIVE EXHIBIT - NOT EVIDENCE

No Dispute Hummel + Nagai Teach All Elements

- **PO does not dispute** that Hummel as modified by Nagai teaches all elements of challenged claims 1, 3-7, 10, 12 and 13. (PO Sur-Reply, 11-13.)
 - Similar to Hummel and Schuhmann, PO focuses **solely on Hummel's need** to improve release effect (improperly ignoring the combined teachings), and wrongly argues **bodily incorporation** of Nagai into Hummel. (PO Sur-Reply, 11-13.)
- PO attempts to **rewrite dependent claim 11** to state that the migrating compound is added to an "**external layer**," rather than using the claim's actual language of "**external side**." (Pet. Reply, 6-7.)

Claim 11: “Added to an External Side”

- Original claim 8 was canceled and replaced with new dependent claim 25 (now issued claim 11).
(EX1002, 117:22-25, 136:2-3; 137:13-15; EX1001, 20:34-36; Pet. Reply, 7 n. 4.)

8. Tubular film according to one or several of the preceding claims, characterized in that the at least one migrating lipophilic or hydrophilic compound is **added to an external layer** containing a thermoplastic olefin homo- or copolymer or a homo- and/or copolyamide.

(Added at EX1002, 117:22-25.)
(Cancelled at EX1002, 136:2-3.)

25. (New) The tubular film according to claim 24, wherein the migrating lipophilic or hydrophilic compound is **added to an external side** containing a thermoplastic olefin homo- or copolymer or a homo- or copolyamide.

(Added at EX1002, 137:13-15.)

11. The insertion tube according to claim 10, wherein the migrating lipophilic or hydrophilic compound is **added to an external side** containing a thermoplastic olefin homo- or copolymer or a homo- or copolyamide.

(EX1001, 20:34-36.)

PO's Attacks on Nagai Fail

- PO's claim that Nagai's coatings (wax or silicone) "**could adversely impact ... mechanical properties**" is baseless and has no support. (POR, 53; Pet. Reply, 8.)
- Obviousness test is not whether Nagai may be **bodily incorporated** into Hummel, but rather what their combined teachings would suggest to a POSITA. *In re Keller*, 642 F.2d 413, 425 (C.C.P.A. 1981). (POR, 53-36; PO Sur-Reply, 11-13; Pet. Reply, 8.)
- PO improperly asserts that Hummel and Nagai use different curing systems to support a baseless claim that the inner film would collapse on UV lamps. (POR, 55; PO Sur-Reply, 12-13.)
 - The '882 Patent discloses "**UV or steam curing.**" (EX1001, 1:15-17, 30-31, 66-67; Pet. 7-8.)
 - Hummel and Nagai **both disclose UV-curing** of resin where the liner is inflated. (EX1005, 5:7-12; EX1009, ¶10012; Pet. Reply, 8.)

No Secondary Evidence of Nonobviousness

No Unexpected Results Alleged in Lawsuit

- PO only made broad unsupported allegations of copying and commercial success. (EX1038, 9-12; Pet., 63.)
- PO has never claimed any “unexpected results” in the over two years of litigation. (EX1038, 9-12; EX1081, 35-36; Pet., 63.)

PO Failed to Compare Results to Closest Prior Art

PO Failed to Rebut Strong *Prima Facie* Case of Obviousness

- Only compared results to **comparative example V1**—which is in the **scope of claim 1**. (POR, 62-68; Pet. Reply, 9.)
- For a coating “**applied over**,” the closest prior art is **Nagai** which discloses applying a “release agent” coating (“wax” or “silicone”) to the film’s external surface. (EX1009, ¶0016; Pet. Reply, 9.)
- For a coating formed by “**migration**,” **Hummel** is the closest prior art which discloses the external layer treated with migrating compounds like “lubricants” and “waxes” from “0.01-20% by weight.” (EX1005, 11:18-12:4; Pet. Reply, 9).

Constab PE-SA 270 Used as “Migrating Compound” in Examples B4-B6

Constab PE-SA 270 Datasheet (EX1051)

Product Information

CONSTAB

Member of **Kafrit** Group

CONSTAB PE-SA 270 Antiblock-Slip Masterbatch

Issued: 22/03/2001
Revised: 01/10/2012

1. Product Description

CONSTAB PE-SA 270 is used for the production of general purpose plain PE-films for packaging. It creates a micro roughness as well as an antiblock additive layer on the film surface to avoid blocking during winding/unwinding of reels and during packaging operations.

- Contains CaCO_3 and a slow migration antiblock additive in PE
- Awards best antiblock properties

(EX1051; Pet. Reply, 10; PO Sur-Reply, 21, 24.)

Composition of Constab PE-SA 270

Compound	Percentage
Polyethylene (Carrier)	Unknown
Calcium Carbonate (Particle-Based Antiblock)	Unknown
<u>Unknown</u> Slip Additive ("slow migration antiblock additive")	Unknown

(EX1051; Pet. Reply, 10; PO Sur-Reply, 21, 24.)

Admissions by PO's Expert (Constab PE-SA 270)

- PO's expert admitted that he did not know what was in Constab PE-SA 270 or the percentage of EBS wax (if any wax) in examples B4-B6. (EX1052, Tr., 166:12-167-7, 177:9-178-21, 179:16-180:2, 180:20-181:4; Pet. Reply, 17.)
- PO's expert testified Constab® PE-SA 270 could contain "**88 percent polyethylene**" which was "normal for a masterbatch." (EX1052, Tr., 199:21-200:17; Pet. Reply, 18.)
- PO's expert testified the actual percentages of "migrating compound" in examples B4, B5, and B6 likely much less than 1%, 4%, and 6%. (EX1052, Tr., 180-181; Pet. Reply, 18-19.)

Constab Family - Additive Handbook

- An additive handbook found by Omega—and used by PO's expert—lists Constab® PE-SA family. (EX1050, p. 14, 1:49-2:12; EX1052, Tr., 184; Pet. Reply, 17-18.)

Additive Handbook (Constab PE-SA Family)

PE-SA 24 [Constab Additive Polymers Ltd]

Chem. Descrip.: 2.5% Erucamide and 15% natural silica in LLDPE-based masterbatch

Uses: Slip/antiblock agent for plastics

Use Level: 2-5%

PE-SA 40 [Constab Additive Polymers Ltd]

Chem. Descrip.: 3% Oleamide and 10% natural silica in LLDPE-based masterbatch

Uses: Slip/antiblock agent for plastics

Use Level: 1-3%

PE-SA 49 [Constab Additive Polymers Ltd]

Chem. Descrip.: 10% Erucamide and 10% precipitated silica in LLDPE-based masterbatch

Uses: Slip/antiblock agent for plastics

Use Level: 0.5-1%

PE-SA 60 [Constab Additive Polymers Ltd]

Chem. Descrip.: 4% Erucamide and 25% natural silica in LLDPE-based masterbatch

PE-SA 72 [Constab Additive Polymers Ltd]

Chem. Descrip.: 2% Erucamide and 10% natural silica in LLDPE-based masterbatch

Uses: Slip/antiblock agent for plastics

Use Level: 2-5%

PE-SA 92 [Constab Additive Polymers Ltd]

Chem. Descrip.: 5% Oleamide and 10% natural silica in LLDPE-based masterbatch

Uses: Slip/antiblock agent for plastics

Use Level: 1-2%

(EX1050, p. 14, 1:49-2:12; EX1052, Tr., 184; Pet. Reply, 11, 14, 17-18.)

Results Lack Commensurability and Nexus to Claim Scope

No Results of “Applied Over” Migrating Compound

- No results of “applied over” migrating compound as claimed in claim 1 of the ‘882 Patent. (Pet. Reply, 10.)
- PO fails to address this issue. (POR; PO Sur-Reply.)

No Results of Other Claimed Migrating Compounds

- Only an unknown “slow migration antiblock additive” used as part of Constab PE-SA 270. (Pet. Reply, 10.)
- No results of other migrating compounds claimed. (Pet. Reply, 10-11.)
- PO fails to address this issue. (POR; PO Sur-Reply.)

Results Not from Claimed “Migrating Compound”

- Increased elongation in examples B4-B6 is from the **polyethylene** in Constab PE-SA 270—a non-migrating compound. (Pet. Reply, 11-12.)
- Increased release effect in examples B4-B6 is from the **calcium carbonate** in Constab PE-SA 270—a non-migrating compound. (Pet. Reply, 12.)
- PO fails to address this issue. (POR; PO Sur-Reply.)

Example B5 – Unknown 1%

- Unknown 1% of material in example B5 unaccounted for. (Pet. Reply, 12.)
- PO fails to address this issue. (POR; PO Sur-Reply.)

No Testing with “Reactive Plastic Resin”

- Claim 1 requires a “reactive plastic resin.” (EX1001, 20:24-26; Pet., 26; Pet. Reply, 12.)
- PO did no testing with a “reactive plastic resin.” (Pet. Reply, 12.)
- PO fails to address this issue. (POR; PO Sur-Reply.)

Comparative Example V1 Had No Unexpected Results

- Claim 1 does not require a minimum amount or thickness of migrating compound. (EX1001, Claim 1; Pet. Reply, 23-24.)
- PO claims example V1 has 0.012% of unknown “slip agent.” (PO Sur-Reply, 20-21.)
- Example V1 falls within claim 1's scope and has no unexpected results. (Pet. Reply, 12.)

Results Are Expected

Results Expected for Lubricant + Antiblock

- Using a lubricant (e.g., wax) and a particle filler/anti-block (e.g., calcium carbonate) would be expected to lower the COF. (EX1013, Fig. 1, ¶¶0080-0090; Pet. Reply, 13.)
- Constab PE-SA 270 is mainly PE and calcium carbonate. (EX1051, Pet. Reply, 10, 11, 14, 16-19.)
- PO's expert said he "anticipated" the increased release effect would be "accompanied by a lowering of the [COF]." (EX2004, ¶¶21, 47; EX1001, 17:56-57; Pet. Reply, 13.)

Results Expected from Silicone Coating

- Silicone is well-known for **increasing release effect**. (Pet. Reply, 13.)
- Silicone's **high elasticity** makes it expected that adding it as a layer would enhance elongation at break properties. (Pet. Reply, 14.)

PE Added to PA Expected to Increase Elongation

- **Constab PE-SA 270 is mainly polyethylene** which is significantly more elastic than polyamide. (EX1050, 14; EX1051; EX1066-EX1067; Pet. Reply, 14.)
- Adding polyethylene from Constab PE-SA 270 to the polyamide layer would inherently increase elongation at break and improve splice formation. (Pet. Reply, 14.)

Results Are Not Superior

- Example B1 (silicone coating) shows a small 2% increase for splice formation and a small 15.9% increase for elongation at break.
- Example B4 (migrating compound) shows an even smaller 1.1% increase for splice formation and an even smaller 8.5% increase for elongation at break.
- The splice formation range for examples B1-B6 is only 17.0-22.8% – **only slightly better than 15.9% for comparative example V1.**
- Furthermore, the elongation at break range for examples B1-B6 is only 89-108.3% – **only slightly better than 80.5% for comparative example V1.**

(Pet. Reply, 14-15.)

Appendix

Hummel (Anticipation)

Claims 1, 4-7, 10-11 Are Anticipated by Hummel (EX1005) – Using PO's Claim Construction

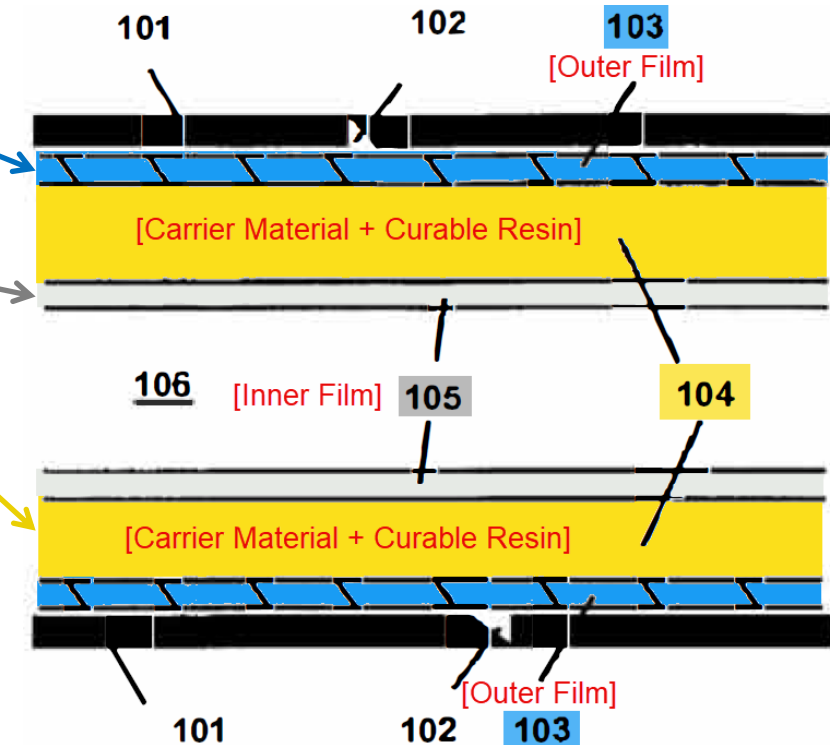
Hummel - Elements [1a]-[1d] of Claim 1

[1a] **Opaque External Tubular Film (103)**

[1b] **Inner Tubular Film (105)**

[1c] **Carrier Material + Reactive Resin (104)**

[1d] Inner Film (105) has **One or Multiple Layers**



(EX1001, 2, 13; Pet., 25-27; EX1005, Fig. 1.)

Hummel Teaches Use of Slip Additives

WO 2011/157356

8

PCT/EP2011/002685

Particularly preferably, layers (c) and (e) each have the same polyamide.

The layers (c) and (e) of the multilayer film according to the invention preferably each have a layer thickness of 5 μm to 100 μm , particularly preferably of 10 μm to 60 μm , independently of one another.

Conventional adhesion promoters can be used to produce the adhesion promoter layers (b) and (d) of the multilayer film according to the invention. Preferably, the adhesion promoter layers (b) and (d) are each independently based on at least one modified thermoplastic polymer, preferably on at least one modified olefin homo- or copolymer. The olefin homo- or copolymers used may be the same olefin homo- or copolymers that are suitable for the production of layer (a), except that they are modified. Particularly preferably, the adhesion promoter layers (b) and (d) are each based independently on at least one modified ethylene homo- or copolymer and/or at least one modified propylene homo- or copolymer modified with at least one organic acid or at least one preferably cyclic organic acid anhydride, preferably with maleic anhydride.

The adhesion promoter layers (b) and (d) of the multilayer film according to the invention preferably each have a layer thickness of 1 μm to 30 μm , particularly preferably of 2 μm to 20 μm , independently of one another.

The layers (a), (c) and (e) and the adhesion promoter layers (b) and (d) of the multilayer film according to the invention can, if necessary, in each case independently of one another, be treated with additives selected from the group comprising antistatic agents, antioxidants, ant blocking agents, antifogging agents, antimicrobial agents, dyes, color pigments, stabilizing agents, preferably heat stabilizers, process stabilizers, processing aids, flame retardants, nucleating agents, crystallizing agents, preferably crystal nucleating agents, lubricants, optical brighteners, flexibilizers, sealing agents, plasticizers, silanes, spacers, fillers, peel additives, waxes, wetting agents, surface-active compounds, preferably surfactants, and dispersants, provided that such additives do not impair UV transmission.

The layers (a), (c) and (e) and the adhesion promoter layers (b) and (d) of the multilayer film according to the invention can, if necessary, in each case independently of one another, be treated with additives selected from the group comprising antistatic agents, antioxidants, ant blocking agents, antifogging agents, antimicrobial agents, dyes, color pigments, stabilizing agents, preferably heat stabilizers, process stabilizers, processing aids, flame retardants, nucleating agents, crystallizing agents, preferably crystal nucleating agents, lubricants, optical brighteners, flexibilizers, sealing agents, plasticizers, silanes, spacers, fillers, peel additives, waxes, wetting agents, surface-active compounds, preferably surfactants, and dispersants, provided that such additives do not impair UV transmission.

(EX1005, 11:18-25; EX1003, ¶¶127-130, 133; Pet., 27-30.)

The layers (a), (c) and (e) and the adhesion promoter layers (b) and (d) of the multilayer film according to the invention may, if necessary, each independently contain at least 0.01-20% by weight, preferably at least 0.1-10% by weight, in each case based on the total weight of a single layer, of at least one of the above additives.

(EX1005, 12:1-4; Pet., 32; Pet. Reply, 9, 25.)

Hummel - Elements [1e]–[1f] of Claim 1

Using PO's Claim Construction

- **PO's Construction:** The term "coating" includes "a migrating compound that is ***added to the outer polymer layer*** and migrates to the surface." (POR, 23.)
- **Hummel:** Discloses that the external layers (a) or (e) may "be treated with additives selected from the group consisting [of] ... **ant[i] blocking agents, ... lubricants, ... waxes, ...** surface-active compounds, preferably **surfactants** ..." (EX1005, 11:18-25; EX1003, ¶¶127-130, 133; Pet., 27-30.)
 - "Waxes" are "migrating compounds" that migrate to the surface of a polymer. (Pet., 4, 28-30; EX1003, ¶¶65-66.)

Declarations Lack Credibility

False Statements About Adhesion Problems

- The inventor declarations falsely claim no adhesion and tearing issues with PO's inner film before the "spring of 2012." (EX2003, ¶¶22-24; EX2004, ¶¶14-19; Pet. Reply, 15-16.)
- **2009 Saertex Complaint:** "During several construction projects, our customers complained on a **massive scale** because **the inner foil you supplied was extremely difficult to remove from the liner after installation.**" (EX1060, p. 2; EX1061-EX1063; Pet. Reply, 15-16.)
- **2006 Saertex Quality Agreement:** "**Strong adhesion of the film to the laminate after curing.**" (EX1058, p. 2 at §1, p. 6 at §7; EX1059, p. 1, §1; Pet. Reply, 16.)

False Statements of Wax Content in B4-B6

- PO falsely asserts that the external layer of examples B4, B5 and B6 contain 1%, 4% and 6% “migrating compound” (wax). (EX1001, 15:15-18, 16:4-50, 18:9-18, 19:58-67; POR, pp. 65, 66, 67:1-11; Ex. 2001, ¶¶69-72; Ex. 2004, ¶¶36, 41-43, 48, 58; Pet. Reply, 16-17.)
- Constab® PE-SA 270 was used as the “migrating lipophilic compound” (wax). (Pet. Reply, 17.)
 - Constab® PE-SA 270 is mainly comprised of non-migrating compounds (polyethylene and calcium carbonate) with an unknown “slow migration antiblock additive.” (EX1051; EX1050, p. 14, 1:49-2:12; Pet. Reply, 17.)
- PO’s expert admitted examples B4, B5, and B6 would most likely contain much less than the 1%, 4%, and 6% represented to the Board. (EX1052, Tr., 180:20-181:4; Pet. Reply, 18-19.)

Dr. Boutrid's Testimony of Wax Added to Example B6

57. Another clear improvement is also seen in the elasticity until break. Whereas comparative example V1 breaks already under an elongation of 80.5%, the polysiloxane-coated tubular film from example B1 can elongate 96.4% (15.9% more than V1), and in the case of the polysiloxane-coated tubular film from example B3 the elongation is 100.0% (19.5% more than the reference V1). The improvement of the elongation until break becomes clearest in the tubular film coated with polysiloxane from example B2, where the elongation until break is 108.3%—even 27.8% greater compared to the reference V1.

58. Additivation with wax also causes a noticeable increase in tubular film elasticity until film splice and film break, as the comparison of examples B4-B6 with the non-additivated film from comparative example V1 shows. Anyhow, the addition of 6% wax (example B6) increases elasticity until film splice by up to 2.5% compared to the film from comparative example V1. Film elongation until break improves by more than 12% in the film of example B6 compared to the film from comparative example V1 (in example 4: 8.5%, in example 5: 11.1%). Siliconization in both sides of a tubular film (laid flat) significantly increases elasticity until splicing or break. Additivation with wax leads to noticeable improvements too.

59. A possible cause for this surprising and positive effect with regard to the mechanical properties of the tubular film according to the invention can be an

- 25 -

BUERGOLFOL - Exhibit 2004, Page 25 of 27
Omega Liner Company, Inc. v. Buergolf GmbH

58. Additivation with wax also causes a noticeable increase in tubular film elasticity until film splice and film break, as the comparison of examples B4-B6 with the non-additivated film from comparative example V1 shows. Anyhow, the addition of 6% wax (example B6) increases elasticity until film splice by up to 2.5% compared to the film from comparative example V1. Film elongation until break improves by more than 12% in the film of example B6 compared to the film from comparative example V1 (in example 4: 8.5%, in example 5: 11.1%). Siliconization in both sides of a tubular film (laid flat) significantly increases elasticity until splicing or break. Additivation with wax leads to noticeable improvements too.

(EX2004, ¶158.)

Dr. Brant's Testimony of Wax Added to Example B4

expect that other polysiloxanes coated in similar or slightly different amounts would not also provide the improved mechanical properties disclosed by the '882 patent. In addition, it is possible that use of an extremely large amount of polysiloxane, or a very small amount of polysiloxane to form the coating would not provide improved mechanical properties, but a person having ordinary skill in the art would not have reasonably considered those amounts to be within the scope of '882 patent invention.

69. For tubular films with additional wax added as a migrating material to form the coating or covering on the external layer, the following samples B4-B6 were prepared. For Example B4: Structure of the inner tube film: thickness 200 µm; with 1% release wax Constab PE-SA 270 (migrating additive) made from ethylene bis stearamide (EBS) in the polyamide external layer:

Layer number	Composition	Proportion in layer in %	Thickness in µm
1	Durethan C38 F	87.5	40
	Durethan B40 FAM	11.5	
	Constab PE-SA 270	1.0	
2	Adhesive promoter: Admer NF 498 E	100	10
3	Lupolen 2420 F	70	65
	Exceed 1327 CA	30	
4	Adhesive promoter: Admer NF 498 E	100	10
5	Lupolen 2420 F	70	75
	Exceed 1327 CA	30	
Sum:			200 µm

47

BUERGOFOL - Exhibit 2001, Page 47 of 52
Omega Liner Company, Inc. v. Buergofol GmbH

69. For tubular films with additional wax added as a migrating material to form the coating or covering on the external layer, the following samples B4-B6 were prepared. For Example B4: Structure of the inner tube film: thickness 200 µm; with 1% release wax Constab PE-SA 270 (migrating additive) made from ethylene bis stearamide (EBS) in the polyamide external layer:

(EX2001, ¶169.)

Comparative Example V1 False Claims

- **'882 Patent:** Example V1 is "*without wax additivation*." (Ex. 1001, 15:20-28; Pet. Reply, 19.)
- **PO's Response:** Example V1 has an "*amount of wax* in the external polymer layer is less than 0.012%." (POR, 21.)
- **Dr. Boutrid:** Example V1 has an unidentified "*slip agent*" "**less than 0.12%.**" (EX2004, ¶37; Pet. Reply, 20.)
- **PO's Expert:** Admitted no knowledge of the additives in Example V1. (EX1052, Tr., 112:3-7, 113:5-13, 114:8-115:2, 116:17-118:5, 138:1-3, 151:2-152-1, 162:11-163:4; Pet. Reply, 20.)
- **Datasheet:** The datasheet for Durethan® B40FAM reveals it has a "*high slip agent and lubricant content*." (EX1049, 1:3; Pet. Reply, 20.)
- **PO's Sur-Reply:** Fails to specify the amount/type of "slip agent" in Example V1, now vaguely refers to an unknown "*amount of migrating compound*." (PO Sur-Reply, 16-18.)

German Inventor Declarations Improper

- The inventors signed **English-language declarations** (EX2003, EX2004) even though German is their native language and require a translator. (Paper 18, 2:9-11; Pet. Reply, 20.)
- Declarations were not signed “**under penalty of perjury**” as mandated by 28 U.S.C. § 1746. (Pet. Reply, 20-21.)

PO's Threats to Lead Inventor Dr. Stark

- **May 22, 2024:** PO's counsel threatened lead inventor, Dr. Kurt Stark, with legal action and "damages." (EX1068, p. 3; EX1069; Pet. Reply, 21.)
- **June 21, 2024:** PO's counsel emailed Dr. Stark a declaration to sign without prior discussion giving only three business days to sign. (EX1070-EX1071; Pet. Reply, 21.)
- **June 26, 2024:** Dr. Stark emailed Petitioner a marked-up version of the declaration identifying false statements. (EX1072; Pet. Reply, 21.)

“Applied Over” v. “Migration”

"Applied Over" = External

Specification: Consistently describes "applied" as an external process for providing (attaching) a thin layer of material to the surface of a film.

- Coating "provided on a portion" of external side. (EX1001, 3:41-46; Pet. Reply, 21-22.)
- Strips of material "**applied**" to the surface. (EX1001, 3:46-56 ; Pet. Reply, 21-22.)
- Coating "**applied**" by machine. (EX1001, 4:1-3 ; Pet. Reply, 21-22.)
- "**Applied**" to film by "coating machine." (EX1001, 11:12-19 ; Pet. Reply, 21-22.)
- Fig. 3 "**applied** in stripes." (EX1001, 12:1-2; 51-54 ; Pet. Reply, 21-22.)
- Testing -- "adhesive **applied** on an adhesive strip." (EX1001, 13:14-17 ; Pet. Reply, 21-22.)
- "Applying" by machine. (EX1001, 15:65-16:2 ; Pet. Reply, 21-22.)

"Migration" = Internal

Specification: Consistently describes "migration" as an internal process causing the formation of a thin layer of material on the surface of a film.

- Migrating compound "contained in" one of the layers. (EX1001, 4:15-19; Pet. Reply, 21-22.)
- "Coating" is "caused" by the "migrating movement." (EX1001, 5:26-30; Pet. Reply, 21-22.)
- "Migration to the surface is facilitated." (EX1001, 18:19-20; Pet. Reply, 21-22.)
- "A thin wax film (due to migration to the surface)." (EX1001, 20:5-10; Pet. Reply, 21-22.)