UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

NEIL SCHULTZ,	)	
	)	
Plaintiff,	)	
	)	Judge Joan B. Gottschall
v.	)	
	)	Case No. 10 C 0071
iGPS COMPANY LLC and	)	
SCHOELLER ARCA SYSTEMS, INC.,	)	
	)	
Defendants.	)	

MEMORANDUM OPINION & ORDER

Plaintiff Neil Schultz filed an action against Defendants iGPS Company LLC and Schoeller Arca Systems, Inc. ("iGPS" and "SAS," collectively "Defendants"), alleging infringement of certain patent claims in two patents owned by Schultz related to the manufacture of flame-retardant plastic pallets, which are used for moving and storing goods. The patents-in-suit are U.S. Patent No. 6,745,703, "Composite Pallet Member," issued June 8, 2004 ("the '703 Patent"), and U.S. Patent No. 6,758,148, "Fire Blocking Method and Apparatus," issued July 6, 2004 ("the '148 Patent"). The parties dispute the construction of eight claim terms in the '703 Patent and three claim terms in the '148 Patent. On October 11, 2012, the court held a claim construction hearing on the disputed terms. The court now construes the terms as set out below.

I. BACKGROUND

This is an action for patent infringement under the United States patent laws, 35 U.S.C. § 271, et seq. Inventors Bruce Torrey and Neil Schultz collaborated to develop fire-retardant pallets. They filed for patents in 2001, and the '703 and '148 Patents were issued in 2004.

Shultz sued Defendants for patent infringement on September 15, 2009. Schultz claims in his Second Amended Complaint that SAS makes a plastic pallet characterized as being "fire retardant" that infringes the '703 and '148 Patents, and that iGPS, which operates a pallet rental service, offers the accused pallet for rent. (Second Am. Compl. ¶¶ 11-12, ECF No. 24.) The accused pallet is made from two decks. The top deck is "thermoformed"—heated and formed in a mold—from two sheets of plastic. It contains slots and hand holds. The bottom deck is made from two injection-molded parts that are welded together with steel tubes between the pieces. The upper part of the bottom deck has spacers that are welded to the lower sheet of the top deck. The accused pallet has no coating or surface treatment.

Defendants moved to dismiss the case for lack of standing, arguing that Schultz had no ownership interest in the patents at issue. That motion was denied. (See Mem. Op. and Order Aug. 16, 2011, ECF No. 311.)

II. LEGAL STANDARDS FOR CLAIM CONSTRUCTION

Patent claims are the part of a patent that define the scope of the protection granted by the patent. The interpretation of a patent claim is a question of law to be determined by the trial court. *Markman v. Westview*, 517 U.S. 370, 391 (1996). By giving meaning to the claim terms, the court defines the scope of the invention which the patentee has the right to protect.

The Court begins its analysis with the words of the claims themselves, giving those words their ordinary and customary meaning, which is the "meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005) (*en banc*). The person of ordinary skill is deemed to understand the meaning and usage of the words in the particular field of technology. *Multiform Desiccants, Inc. v. Medzam, Ltd.*, 133 F.3d 1473, 1477 (Fed. Cir. 1998). The court

assumes that the person of ordinary skill has read the claim term "in the context of the entire patent, including the specification." *Phillips*, 415 F.3d at 1313.[1]

The court is to focus on the "intrinsic" record in construing claim terms. *Phillips*, 415 F.3d at 1313. This means that the court should look at the claim term in the context of the entire patent. This includes the specification, which is a description of the invention that may include drawings of the patent, preferred embodiments of the invention, and examples of how to practice the invention. If the specification includes examples, the court must be careful to determine whether those examples are meant to limit the invention to those specific examples, or whether the examples are not strictly coextensive with the patent, which may also cover other manifestations of the invention. *Id.* at 1323. The court should also look at the patent's prosecution history—the process by which the applicant obtained the patent from the U.S. Patent and Trademark Office ("PTO"). This may reveal express representations made by the applicant regarding the scope of the patent. *See Southwall Techs., Inc. v. Cardinal IG Co.*, 54 F.3d 1570, 1576 (Fed. Cir. 1995) ("Claims may not be construed one way in order to obtain their allowance and in a different way against accused infringers.").

Courts may also look to extrinsic evidence to "shed useful light on the relevant art." *Phillips*, 415 F.3d at 1317. This may include expert and inventor testimony, dictionaries, and

[1] Here, the parties offer competing definitions of the person of ordinary skill in the art. Plaintiff suggests that this is a person with a minimum of two years of experience in the manufacture of plastic pallets, with some knowledge of flame-retardant technologies suitable for use in the design and manufacture of such pallets. (Giannelis Decl. (in Supp. of Pl.'s Responsive Claim Construction Br.) ¶ 9, ECF No. 245.) Defendants suggest that it is a person with at least a Bachelor of Science degree and two years of experience in the design of products made of composite materials. (Duvall Decl. (in Supp. of Defs.' Reply Claim Construction Br.) ¶ 10, ECF No. 253.) The court does not find the difference between the proffered definitions to be significant for the purposes of claim construction and will assume that the person of ordinary skill is someone with at least two years of experience in the design and manufacture of products made of plastic, with some knowledge of the flame retardant properties of composite materials, but who does not have an advanced degree in materials science or chemistry.

treatises. *Id.* Extrinsic evidence may help the court to understand the relevant technology or who a person of ordinary skill in the art might be. But the court should consider such evidence only after examining the intrinsic evidence, and "extrinsic sources like expert testimony cannot overcome more persuasive intrinsic evidence." *Kara Tech. Inc. v. Stamps.com Inc.*, 582 F.3d 1341, 1348 (Fed. Cir. 2009). Dictionary definitions may be consulted as a form of extrinsic evidence. The court need not give a claim term its broadest dictionary definition, but rather the most appropriate definition in light of the intrinsic evidence. *Phillips*, 415 F.3d at 1320-23.

III. CLAIM CONSTRUCTION ANALYSIS

A. Asserted Claims

Schultz asserts that Defendants are infringing Claims 1, 6-8, 10-14, 16, 18, 20-23, 31, 34, 36, 37, 39, 41, 42, and 46 of the '703 Patent. (Pl.'s Final Infringement Contentions, Defs.' Claim Construction Hr'g Ex. 4.) Claims 1 and 31 are independent claims. Their text is as follows:

> 1. A composite pallet member comprising: at least one deck member having a first surface and a second surface; said deck member having a plurality of open spaces, said open spaces extending between said first and second surfaces; and a strengthening layer positioned against at least one of said first surface and said second surface, wherein said deck member is composed of a nanocomposite material comprising a polymer material integrated with a clay, said clay comprising between 0.1% and 20% by weight of said nanocomposite.
>
> 31. A composite pallet member comprising: at least one deck member having a first surface and a second surface; said deck member having a plurality of open spaces in said first and second surfaces; and a strengthening layer positioned against at least one of said first surface and said second surface, said strengthening layer at least partially closing at least some of said open spaces in said at least one surface, wherein a first set of said plurality of open spaces extend from said first surface toward said second surface and terminate in a closed end at said second surface, and a second set of said plurality of open spaces extend from said second surface toward said first surface and terminate in a closed end at said first surface, wherein said open spaces decrease in crosssectional area as said open spaces extend toward their respective closed ends.

(Joint App. ("J.A.") 307-08, ECF No. 190-6.) The other asserted claims of the '703 Patent are dependent on one the independent claims—meaning that they narrow the scope of the claims on which they depend by adding additional subject matter to them. Disputed claim terms appear in the following dependent claims:

> 10. The composite pallet member according to claim 1, wherein said nanocomposite material comprises flame retardant resins.
>
> 20. The composite pallet member according to claim 1, wherein said pallet member includes a plurality of mechanically integrated legs.
>
> 21. The composite pallet member according to claim 20, wherein said legs are composed of at least one material chosen from the group of materials consisting of wood, plastic, particle board and metal.
>
> 22. The composite pallet member of claim 20, wherein said legs are composed of a nanocomposite material comprising a polymer material integrated with a clay, said clay being between 0.1% and 20% by weight of said nanocomposite.
>
> 23. The composite pallet member of claim 22, wherein said clay in said legs comprises between .1% and 10% by weight of said nanocomposite.
>
> 41. The composite pallet member according to claim 31, wherein said pallet member includes a plurality of mechanically integrated legs.
>
> 42. The composite pallet member according to claim 41, wherein said legs are composed of at least one material chosen from the group of materials consisting of wood, plastic, particle board and metal.

(J.A. 308.)

Schultz asserts that Defendants infringe two independent claims of the '148 Patent, Claims 18 and 19. (Pl.'s Final Infringement Contentions.) The text of the claims is as follows:

> 18. A pallet assembly comprising: at least one pallet member having external surfaces; and a flame retardant material affixed to said at least one pallet member so as to substantially cover all of said external surfaces of said pallet member, wherein said flame retardant material is composed of a nanocomposite comprised of a clay that includes a silicate derivative.

> 19. A pallet assembly comprising: at least one pallet member having external surfaces; and a flame retardant material affixed to said at least one pallet member so as to substantially cover all of said external surfaces of said pallet member, wherein said flame retardant material is composed of a nanocomposite material comprising a polymer material integrated with a clay, said clay comprising between 0.1% and 20% weight of said nanocomposite.

(J.A. 295.) Schultz also asserts infringement of Claim 20, dependent on Claim 19:

> 20. The pallet assembly of claim 19, wherein said clay comprises between .1% and 10% weight of said nanocomposite.

(*Id.*)

B. Construction of Disputed Claim Terms in the '703 Patent

1. Claim 31: "at"

Claim 31 of the '703 Patent uses the term "at" in the following phrase: "a first set of said plurality of open spaces extend from said first surface toward said second surface and terminate in a closed end *at* said second surface, and a second of said plurality of open spaces extend from said second surface and terminate in a closed end *at* said first surface." (J.A. 308, col. 10:38-43 (emphasis added).) Defendants argue that "at" should be construed to mean "indicating a location in a particular place or position." This, they point out, is consistent with the definition of "at" in *The New Oxford American Dictionary* (2001). (*See* Defs.' App. 4, ECF No. 191.) Plaintiff argues that "at" should be construed to mean "in, on, or near," citing *Merriam-Webster's Collegiate Dictionary* (1998). (*See* Pl.'s App. 6, ECF No. 244.)

Having considered these battling dictionary definitions, the court concludes that Plaintiff's proposed construction would give the term "at" a broader meaning that what was intended by the drafters of the claim. Although "at" may in some instances mean "in, on, or near," the most common and plain meaning of the word "at" is "a location in a particular place or position." Moreover, had the drafters of the '703 Patent wished to convey that the open spaces

in the deck member discussed in Claim 31 terminated "in, on, or near" the surface of the deck member, they would have used one of those terms. The court therefore adopts Defendants' construction of the term "at": "a particular place or position."

2. Claim 10: "flame retardant resin"

The term "flame retardant resin" is used in Claim 10 of the '703 Patent. Defendants first argue that the term is indefinite and cannot be construed because the patent specification provides no standard for measuring the degree to which a resin must resist fire in order for it to be considered "flame retardant." The court disagrees. Claim terms are presumed to be valid, and this term is not so vague as to be indefinite. *Cf. Datamize, LLC v. Plumtree Software, Inc*., 417 F.3d 1342, 1347 (Fed. Cir. 2005) (holding that "aesthetically pleasing" is an indefinite term). The '703 Patent identifies properties of flame retardant plastics, including a decrease in heat and smoke and an increase in char formation. (J.A. 307, col. 7:47-49.) The patent also references the "UL 2335 'Classification of Warehouse Pallet'" standard, according to which "fire retardant qualities" of pallets are assessed. (J.A. 304, col. 1:34-57.) A person of ordinary skill in the art of plastics manufacture with some knowledge of the flame retardant properties of composite materials would understand that, within the context of the patent, a flame retardant resin would exhibit characteristics including a decrease in heat and smoke production and an increase in char formation.

Plaintiff suggests that the term "flame retardant resin" should be construed to mean "resin having flame retardant properties by virtue of the resin chemistry and/or additives." Defendants object to this construction, arguing that the flame retardant properties of the resin must arise from the chemistry of the resin itself, not from additives to the resin.

Within the context of the '703 Patent, Plaintiff's construction is appropriate. The patent states that "flame retardant resins further enhance the fire resistance of pallets. Examples of fire performance enhancing resin technologies used are zirconia, boron oxides, polybenzoxazine, polymers and carbon-silicone resin additives." (J.A. 307, col. 7:42-46.) The patent thus lists different ways that a resin may be rendered "flame retardant," including by virtue of the chemistry of the polymer itself (e.g. the flame retardant polymer "polybenzoxazine") *or* through the use of additives (e.g. boron oxides or carbon-silicone resin additives). The court therefore adopts Plaintiff's construction. The term "flame retardant resin" is defined as "resin having flame retardant properties by virtue of the resin chemistry and/or additives."

3. Claims 20-23, 41, & 42: "leg"

The term "leg" is recited in various dependent claims of the '703 Patent. Plaintiff argues that "leg" should be construed to mean "a spacer between the top and bottom decks of a double-deck pallet, or beneath the top deck of a single-deck pallet." In support of this construction, Plaintiff cites the American Society of Mechanical Engineers' Standard for Pallets (1997) and (2005), which states that the industry standard definition of "leg" in the context of pallets is "a spacer between top and bottom decks or beneath the top deck of a single-deck pallet." (Pl. App. 21, 24.) Defendants, meanwhile, propose that the term "leg" should be construed as a "supporting part, such as a support for a piece of furniture, not pallet material that is a spacer between the upper and lower parts of the pallet." In support, Defendants point to the patent specification and cite *Webster's II New College Dictionary* (2001), which defines "leg" as "[a] supporting part similar to a leg in shape or function." (Defs.' App. 16.)

The court agrees with Defendants that the meaning of "leg" most consistent with the use of the claim term in the '703 Patent is a "supporting part." Although Plaintiff has presented

extrinsic evidence that a "leg" may sometimes be defined as a "spacer," intrinsic evidence from the patent itself trumps any contradictory extrinsic evidence. *Kara Tech. Inc.*, 582 F.3d at 1348. Here, the specification of the '703 Patent distinguishes between "legs" and "pallet material" used to "adhere[] together" pallet members, discussing these as separate features of the exemplary figures. Figure 6 shows a deck member with supporting "legs" that are "mechanically integrated" to the bottom of the deck member. (J.A. 301, 307, col. 7:52-55.) Meanwhile, Figure 2 shows "multiple composite pallet members adhered together with pallet material." (J.A. 298, 306, col. 6:39-41.) These different representations suggest that a "leg" is something different from a spacer between the top and bottom decks of a double-deck pallet, making Defendants' construction appropriate. The court therefore adopts the follow construction of "leg": "a supporting part, such as a support for a piece of furniture, as distinguished from 'pallet material' used as a spacer."

4. Claim 1: "nanocomposite" or "nanocomposite material"

The term "nanocomposite" or "nanocomposite material" is found in many of the claim terms of the '703 Patent, including independent Claim 1. Defendants propose that the claim should be construed as "a composite material, one of whose components is some form of nanoparticle and which, in this case, is prepared by fully dispersing clay platelets into the matrix of a host polymer." Plaintiff offers the following construction: "a composite of mixed materials, one of which is in nanoparticle form (a particle with at least one dimension less than 100nm)." The difference between the proposed constructions is whether the clay must be "fully dispersed" into the host polymer or whether the term encompasses other combinations of clay and a polymer.

Plaintiff argues that a nanocomposite can be formed by mixing another material with clay, without fully dispersing the clay into a host polymer. In support, he cites an article by Wang, et al., which states that nanocomposites may take the following three forms: 1) they may be "immiscible," or formed of "aggregates of clay," 2) they may be "intercalated," or 3) they may be "exfoliated." (Linjiang Wang, Xuejun He and Charles A. Wilke, "The Utility of Nanocomposites in Fire Retardancy," *Materials* 3: 4580, 4584 (2010), Pl.'s App. 125.) The article thus suggests that it is possible to form an "immiscible" nanocomposite by combining aggregates or "lumps" of clay with a plastic.

Under *Phillips*, however, the claim language defines the invention, and the specification is the best guide to interpreting that language. 415 F.3d at 1321. The '703 Patent's specification states that "[n]anocomposite polymers are prepared by fully dispersing or exfoliating intercalated clay platelets . . . into a host polymer." (J.A. 220, col. 2:7-9.) This demonstrates that the definition of "nanocomposite" in the patent encompasses the intercalated or exfoliated, but not the "immiscible," forms of a nanocomposite.

The prosecution history further suggests that full dispersion or integration of the clay into the polymer was used to distinguish the invention detailed in the '703 Patent from prior art. An argument seeking to overcome a rejection based on prior art may "narrow the scope of otherwise broad claim language." *Seachange Int'l, Inc. v. C-Cor Inc.*, 413 F.3d 1361, 1373 (Fed. Cir. 2005). Claim 1 was initially rejected by the PTO because U.S. Patent No. 5,937,767 to Togawa "teaches the use of clay in plastic pallet composites." (J.A. 219-20 ('703 Patent File History).) The patentees then distinguished Togawa by arguing that Togawa used clay as a "filler," rather than showing a "nanocomposite material comprising a polymer material integrated with a clay." (JA-242 ('703 Patent File History).) The court concludes that Claim 1 is not intended to show a

nanocomposite containing aggregates of clay mixed in, as a filler—which would be consistent with Togawa—but instead a nanocomposite incorporating clay that is more highly integrated or fully dispersed into the matrix of the polymer.

Moreover, the exhibits submitted to the court by Plaintiff suggest that such dispersion is critical to the function of a clay-polymer nanocomposite. For example, Du, et al write: "For rubber/clay nanocomposites, it is well known that a good dispersion of the clay and strong interfacial interactions are two critical factors in determining the performance of the nanocomposites." (Minglinag Du, Baochun Guo, and Demin Jia, "Newly emerging applications of halloysite nanotubes: a review," *Polymer International* 59: 574, 577 (2010), Pl.'s Claim Construction Hr'g App. 181, ECF 361-6.) Another article provided to the court by Plaintiff explains that an increase in the "degree of dispersion within the polymer matrix" can "improve[e] the mechanical properties of nanocomposites." (Pooria Pasbakhsh, et al., "EPDM/modified halloysite nanocomposites," *Applied Clay Science* 48: 405-13, 405 (2010), Pl.'s Claim Construction Hr'g App. 188, ECF No. 361-7.)

For all of these reasons, a person of ordinary skill in the art would conclude that a nanocomposite polymer within the context of the '703 Patent is prepared by fully dispersing clay nanoparticles into the matrix of a host polymer. The court therefore adopts the following definition of "nanocomposite" and "nanocomposite material": "A composite material, one of whose components is some form of nanoparticle and which, in this case, is prepared by fully dispersing clay platelets into the matrix of a host polymer."

5. Claims 1 & 31: "open spaces"

The term "open spaces" is used in Claims 1 and 31 of the '703 Patent. Plaintiff argues that the term "open spaces" should be construed as "open areas substantially defined by side

walls." Defendants argue that the limitation of "side walls" should not be read into the claim. The court agrees that nothing in the '703 Patent suggests that the term "open spaces" must be so limited; it therefore rejects Plaintiff's proposed construction.

Defendants argue that "open spaces" mean "air spaces." This construction also introduces an unwarranted limitation into the claim: "air" is not mentioned in the patent, and the patent discusses the possibility that the open spaces could be filled with foam or another substance. (J.A. 309, col. 11:7-10.)

In sum, neither party's proposed construction adds clarity to the meaning of "open spaces," and both constructions would introduce limitations not required by the patent and specification. Therefore, the court will not construe the term "open spaces." It is clear on its face and does not require additional construction.

6. Claims 1 & 31: "strengthening layer"

Defendants propose that the term "strengthening layer," which appears in Claims 1 and 31 of the '703 Patent, should be construed to mean "a thickness that overlies another component that strengthens a pallet and provides the pallet with durability and load support." Plaintiff proposes that the term be limited to a layer that is "substantially flat and planar." Defendants respond that a strengthening layer need not be restricted to a flat sheet.

The court agrees with Defendants that nothing in the claim or specification states that the strengthening layer must be flat. Rather, the description of Figure 7 in the '703 Patent specification states that the "strengthening layer can be included on the legs" (J.A. 307, col. 8:12-14.) This would result in a strengthening layer that was not flat, but shared the pyramidal shape of the legs. Nor does the commonly understood definition of "layer" require it to be flat. Plaintiff's proposed construction would thus import unwarranted limitations into the claim term.

The court therefore construes "strengthening layer" to mean "a thickness that overlies another component that strengthens a pallet and provides the pallet with durability and load support."

7. Claims 1 & 31: "surface"

Defendants propose that the term "surface," used in Claims 1 and 31 of the '703 Patent, be construed to mean a "layer." Plaintiff argues that "surface" should be defined as "exterior boundary or face." The difference in the proposed constructions is that Defendants' construction would require the surface to have a thickness or three-dimensional quality.

Defendants point to Figures 1 and 2 of the '703 Patent, arguing that they refer to as "surfaces" the top and bottom layers of the deck member and show "open spaces" extending between and terminating at the "surfaces." (*See* J.A. 298.) Defendants argue that, because the claim terms may not be construed so as to exclude preferred embodiments of the patent, "surface" must be understood as having three dimensions. This would allow the "open spaces" to extend to and terminate at the underside of the "surface" layer. Such a configuration would be impossible if the "surface" were only the two-dimensional external face of the pallet member.

The court agrees that the preferred embodiments demonstrate that "surface" is used in the '703 Patent to refer to a layer, not simply the external face of the pallet member. Although a claim need not be strictly coextensive with the preferred embodiments depicted in the drawings, it must at least be consistent with the preferred embodiments. *See Phillips*, 415 F.3d at 1323. The court therefore construes the term "surface" to mean "exterior layer."

8. Claim 1: "clay"

Plaintiff argues that a person of ordinary skill in the art would understand clay, as used in Claim 1 of the '703 Patent, to mean "a material composed primarily of silicate mineral particles having diameters of less than approximately 2 micrometers." Defendants contend that this

definition is overly broad because it would include any "silicate mineral particle" of a particular size, including sand and other materials that are not clay. Defendants argue that "clay" should be more narrowly defined as "a finely crystalline hydrous silicate material having a layered structure."[2]

In support of his broader definition of "clay," Plaintiff argues that not all types of clay are hydrous or layered. Although the '703 Patent refers to the exfoliation of intercalated clay platelets (*see* J.A. 220, col. 2:7-9), Plaintiff argues that these references to exfoliation and intercalation describe only a potential embodiment of the invention. Plaintiff points out that halloysite is a type of clay with a tubular, rather than a plate-like structure. Plaintiff further argues that nanocomposites can be created using silicate mineral particles that do not have a layered structure, and that that polymer/clay nanocomposites can be made with clay through processes other than delamination or exfoliation, meaning that the creation of a nanocomposite does not rely on the layered structure of clay. Plaintiff also provides a dictionary definition of clay that states: "The fraction of an earthy material containing . . . particles . . . finer than three micrometers." (*McGraw Hill Technical Dictionary of Sci. and Tech. Terms*, Sixth Ed. 404 (2003), ECF No. 266-2.) Thus, Plaintiff argues, the definition of clay does not necessarily require that it be layered or hydrous.

Although there are nanocomposites made of other types of silicate particles, in the context of the '703 Patent, a person of ordinary skill in the art would understand "clay" to mean a hydrous silicate material with a layered structure. Despite the existence of at least one type of clay (halloysite) that has a tubular rather than a plate-like layered structure, the patent clearly contemplates the use of clay with a layered structure, because it refers to delamination and

[2] Defendants indicated during the claim construction hearing that they do not disagree with the 2 micrometer limitation on particle size.

exfoliation, which are processes through which clay nanocomposites are formed that rely on the plate-like structure and hydrous nature of the clay. The patent also discusses bentonite and montmorillonite, types of clay which have a layered, plate-like structure susceptible to exfoliation.

Even the materials submitted by Plaintiff indicate that the common understanding of clay is that it is a hydrous, layered substance. Plaintiff submits a U.S. Geological Survey handout stating that "[t]he characteristics common to all clay minerals derive from their chemical composition, layered structure, and size." (Pl.'s Claim Construction Hr'g App. 118, ECF No. 361-1.) Another article submitted by Plaintiff states that "[t]he nanometer-scale material which has been most investigated is layered clay, primarily including layered silicates (montmorillonite (MMT) is the most studied member of this family)." (Wang, et al. at 4580, Pl.'s Claim Construction Hr'g App. 121, ECF No. 361-2.) The article goes on to discuss "polymer-layered clay nanocomposites," noting that the improved "thermal stability of polymer-clay nanocomposites is due to the nano-sized layers . . ." (*Id.* at 4581.)[3]

The court concludes that a person with approximately two years of experience in the manufacture of plastic pallets, with some knowledge of the flame retardant technologies suitable for use in the design and manufacture of such pallets, would read the '703 Patent as referring to

[3] Even the existence of halloysite, a clay containing particles with a "tubelike structure," does little to undermine Defendants' argument that the definition of clay should include "layered." An article submitted by Plaintiff describes halloysite as a "layered silicate." (Mohtashim Shamsi, et al, "Plasma-modified halloysite nanocomposites: effect of plasma modification on the structure and dynamic mechanical properties of halloysite-polystyrene nanocomposites," *Polymer International* 59: 1492-98 (2010), Pl.'s Claim Construction Hr'g App. 163, ECF 361-4.) Another states that halloysite "is a two-layered aluminosilicate" with "repetitive two-layered sheets comprising [a] spiral wall." (Sandip Rooj, et al, "Preparation and properties of natural nanocomposites based on natural rubber and naturally occurring halloysite nanotubes," *Materials and Design* 31:2151-56 (2010), Pl.'s Claim Construction Hr'g App. 171, ECF No. 361-5.)

types of clay subject to intercalation, exfoliation, or delamination. The court therefore construes the term "clay" as "a finely crystalline hydrous silicate material having a layered structure and composed primarily of particles having diameters of less than approximately 2 micrometers."

C. **Construction of Disputed Claim Terms in the '148 Patent**

1. Claims 18 & 19: "a flame retardant material affixed to said at least one pallet member so as to substantially cover all of said external surfaces of said pallet member"

The term "a flame retardant material affixed to said at least one pallet member so as to substantially cover all of said external surfaces of said pallet member" appears in Claims 18 and 19 of the '148 Patent. Defendants argue that the term should be construed so as to mean that (1) the flame retardant material is physically attached to the outer parts or layers of the pallet member, with the pallet member being previously formed; and (2) the flame retardant material overlays or hides from sight nearly all of the outer parts of the pallet member. In support of this construction, Defendants point to the '148 Patent specification, which shows in Figure 1 a pallet member without flame retardant material, and in Figure 2 a pallet member with a flame retardant covering. (*See* J.A. 290.) The figures depict the material as laid on the external surface of the pallet member. (J.A. 293, col. 4:10-20).

Plaintiff argues that Figure 2 shows only one embodiment of the invention. Plaintiff construes the disputed term as meaning that flame retardant material appears "here and there on the surface of the pallet." According to Plaintiff, the material may be "incorporated into" or "attached to" the pallet through various methods, such as extrusion or in-mold processing.

The Court begins its analysis with the words of the claims themselves, giving those words their ordinary and customary meaning to a person of ordinary skill in the art. *See Phillips*, 415 F.3d at 312-13. Consistent with the common meaning of "affixed" and "external surfaces," the court concludes that the flame retardant material referred to in the patent is a separate

component from the pallet member, and that the material is physically attached to the outer parts of the pallet member.

This construction is supported by the background of the '148 Patent, which describes prior art in which flame retardant materials are incorporated into the pallet member during the composition or molding of the pallet. (J.A. 292, col. 1:45-50). The background section suggests that the shortcomings of this approach are solved by "affixing" a flame retardant material to the pallet member to substantially cover it. (J.A. 292, col. 2:10-19.) The production method described involves two steps: 1) creating the pallet, and 2) affixing the flame retardant material. (J.A. 292, col. 2:25-30.) The summary of the invention also describes it as involving "a flame retardant material that provides a covering to the pallet member" and provides as examples of the material a fabric and liquid applied to the pallet member's external surfaces. (J.A. 292, col. 2:30-31, 36, 49.)

For these reasons, the court construes the term "a flame retardant material affixed to said at least one pallet member so as to substantially cover all of said external surfaces of said pallet member" to mean that "1) the flame retardant material and the pallet member are separate components, 2) the flame retardant material is physically attached to the outer parts or layers of the pallet member, and 3) the flame retardant material overlays nearly all of the outer parts of the pallet member."

2. Claims 18 & 19: "nanocomposite/nanocomposite material"

As in the '703 Patent, "nanocomposite" and "nanocomposite material" are construed as "a composite material, one of whose components is some form of nanoparticle and which, in this case, is prepared by fully dispersing clay platelets into the matrix of a host polymer."

3. Claims 18 & 19: "clay"

As in the '703 Patent, the term "clay" is construed as "a finely crystalline hydrous silicate material having a layered structure and composed primarily of particles having diameters of less than approximately 2 micrometers."

IV. THE COURT'S CONSTRUCTION OF THE DISPUTED CLAIM TERMS

Having considered the submissions and oral presentations of both sides, the court orders as follows:

1. As used in Claim 31 of the '703 Patent, "at" is construed to mean "indicating a location in a particular place or position."

2. As used in Claim 10 of the '703 Patent, "flame retardant resin" is construed to mean "resin having flame retardant properties by virtue of the resin chemistry and/or additives."

3. As used in Claims 20-23, 41, and 42 of the '703 Patent, "leg" is construed to mean "a supporting part, such as a support for a piece of furniture, as distinguished from 'pallet material' used as a spacer."

4. As used in Claim 1 of the '703 Patent and Claims 18 and 19 of the '148 Patent, "nanocomposite" and "nanocomposite material" are construed to mean "a composite material, one of whose components is some form of nanoparticle and which, in this case, is prepared by fully dispersing clay platelets into the matrix of a host polymer."

5. As used in Claims 1 and 31 of the '703 Patent, "open spaces" is interpreted according to its plain meaning and requires no further construction.

6. As used in Claims 1 and 31 of the '703 Patent, "strengthening layer" is construed to mean "a thickness that overlies another component that strengthens a pallet and provides the pallet with durability and load support."

7. As used in Claims 1 and 31 of the '703 Patent, "surface" is construed to mean "exterior layer."

8. As used in Claim 1 of the '703 Patent and Claims 18 and 19 of the '148 Patent, "clay" is construed as "a finely crystalline hydrous silicate material having a layered structure and composed primarily of particles having diameters of less than approximately 2 micrometers."

9. As used in Claims 18 and 19 of the '148 Patent, the term "a flame retardant material affixed to said at least one pallet member so as to substantially cover all of said external surfaces of said pallet member" is construed to mean that "1) the flame retardant material and the pallet member are separate components, 2) the flame retardant material is physically attached to the outer parts or layers of the pallet member, and 3) the flame retardant material overlays nearly all of the outer parts of the pallet member."

ENTER:

/s/
JOAN B. GOTTSCHALL
United States District Judge

DATED: January 17, 2013