

Mock Case for JSIP2020

1. Case Summary

Pony Corporation (“Pony”) filed a patent application relating to a hollow golf club head (the “Invention”) on January 11, 2002, and a patent based on the application was registered on September 30, 2005 (Patent Number 20201028) (the “Patent”; and the right based on the Patent is referred to as the “Patent Right”).

Donkey Corporation (“Donkey”) has been manufacturing and selling golf clubs with the product name “Super IP 2020” (the “Defendant’s Product”) in the course of trade since April 20, 2017.

On December 12, 2019, Pony filed a patent infringement lawsuit against Donkey alleging that the act of manufacturing and selling the Defendant’s Product infringes the Patent, and sought (i) an injunction to suspend the manufacturing and selling of the Defendant’s Product, and (ii) payment of damages in an amount of USD 5 million.

2. Claimed Invention (Claim 1 of the Patent)

A hollow golf club head, comprising a head body having a hollow structure and formed by coupling together a metallic outer shell member and a fiber reinforced plastic (FRP) outer shell member at their respective bonding portions, wherein;

a plurality of through-holes are provided in the bonding portion of the metallic outer shell member;

the bonding portion of the metallic outer shell member is bonded to the bonding portion of the FRP outer shell member by interposing an FRP thread member along with adhesive material between the metallic outer shell member and the FRP outer shell member, the FRP thread member maintaining a shape of passing through the plurality of the through-holes and running alternately on inner and outer surfaces of the metallic outer shell member; and

each matrix of the FRP outer shell member and the FRP thread member contains epoxy resin.

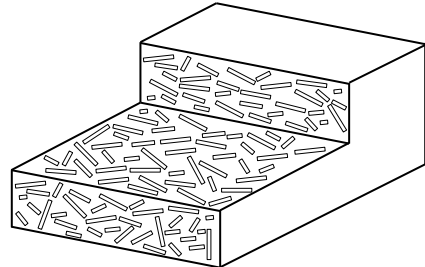
3. Background art (partly hypothetical)

- “FRP”

Standing for “Fiber-Reinforced Plastic.”

FRP is a composite material made of a plastic (resin), e.g. epoxy resin, as a matrix and a fiber, e.g. carbon fiber, glass fiber, as a material reinforcing the matrix.

The right figure provides a sectional view of one type of FRP where short fibers are dispersed in a resin.



There are various ways to produce FRPs, such as blending fibers to a matrix resin as shown in the right figure by way of injection molding of a mix of a resin and short fibers, and impregnating a bundle of long fibers with a resin, as with the FRP thread member of the Invention.

- Epoxy resin

A kind of thermosetting resin. Commonly known is epoxy resin which is of high viscosity in liquid state under normal temperature and is thermally cured after mixing a main agent and a curing agent. Also used as adhesive material for metals.

- “FRP thread member” of the Invention

“A bundle of carbon fibers impregnated with epoxy resin” (See [0011] bellow and the diagram on the right).



The FRP thread member can easily pass through the through-holes because of the use of epoxy resin which is liquid when it passes through the through-holes, and is able to temporarily maintain the shape of passing through the through-holes because the epoxy resin is sticky due to its viscosity. Then, the epoxy resin is thermally cured to solidly maintain the shape of passing through the through-holes.

4. Specification (extract)

[Detailed Explanation of the Invention]

[Technical Field]

[0001]

[...]

[Background Art]

[0002]

Commonly known golf club heads are made by the combination of different types of materials, such

as a metallic material with a fiber-reinforced plastic (“FRP”). For example, US PAT. XXXXX discloses a hollow golf club head comprising a metallic casing (outer shell member) coupled with an FRP cover (outer shell member), wherein the FRP cover comprising epoxy resin as a matrix and a carbon fiber sheet as a reinforcing material is bonded with adhesive material to cover openings on the upper surface of the casing (see Fig. 3).¹ This hollow golf club head is beneficial in that the center of gravity can be set arbitrarily based on the combination of metallic/resin materials or the shape, and that the head volume can be maximized within the limited scope of the head weight (head mass); enabling improvement of the performance of golf clubs in terms of, among others, flying distance and direction.

[0003]

However, in the case of a hollow head body which is structured by bonding a metallic outer shell member to an FRP outer shell member, there was a drawback that, depending on the metallic material used for the metallic outer shell member, it may be difficult to ensure sufficient bonding strength, thus durability as a golf club head, when only adhesive material is used to bond the FRP outer shell member to the metallic outer shell member.

[Summary of the Invention]

[Problem to be Solved by the Invention]

[0004]

The present invention has the objective of providing a hollow golf club head capable of enhancing the bonding strength of a metallic outer shell member and an FRP outer shell member, regardless of the kind of the metallic material to be used in the metallic outer shell member.

[Means for Solving the Problem]

[0005]

To achieve the above objective, the present invention provides a hollow golf club head, comprising a head body having a hollow structure and formed by coupling together a metallic outer shell member and a fiber reinforced plastic (FRP) outer shell member at their respective bonding portions, wherein a plurality of through-holes are provided in the bonding portion of the metallic outer shell member; the bonding portion of the metallic outer shell member is bonded to the bonding portion of the FRP outer shell member by interposing an FRP thread member along with adhesive material between the metallic outer shell member and the FRP outer shell member, the FRP thread member maintaining a shape of passing through the plurality of the through holes and running alternately on inner and outer surfaces of the metallic outer shell member; and each matrix of the FRP outer shell member and the FRP thread member contains epoxy resin.

[0006]

[...]

¹ The referred publication is US5624331A.

[Effect of the Invention]

[0007]

According to the present invention, since epoxy resin contained in the FRP thread member (may be simply called “thread member”) is cured in a state where the thread member is interposed between a metallic outer shell member and an FRP outer shell member and passes through the through-holes, the thread member is able to maintain the shape of passing through the through-holes and thereby hook² the metallic outer shell member. Further, the FRP outer shell member and the thread member, both containing epoxy resin as a matrix, are tightly bonded to each other after curing. Therefore, when a force to detach the FRP outer shell member is applied, the thread member works to tie the FRP outer shell member to the metallic outer shell member because the thread member maintains the shape of hooking the metallic outer shell member on the surface opposite to the bonding surface. Hence, it is possible to enhance the bonding strength of the metallic outer shell member and the FRP outer shell member even if the metallic material used for the metallic outer shell member is not well-adhesive to the FRP outer shell member.

[Brief Description of the Drawings]

[0008]

FIG. 1 illustrates a golf club head in an embodiment of the present invention: (a) is a plan view; (b) is a front view; and (c) is a sectional view taken along line A-A.

FIG. 2 illustrates the form of bonding in a golf club head of the present invention: (a) is a sectional view of the bonding portion taken along line B-B’ (see FIG. 1 (a) and (c)); (b) is a view of the bonding portion from the side of the metallic outer shell member (see FIG. 1 (c)); and (c) is an enlarged view of the bonding portion.

FIG. 3 is a diagram illustrating a conventional hollow golf head.

[Description of Embodiments]

[0009]

FIG. 1 (a) to (c) illustrate a golf club head in an embodiment of the present invention. As shown in FIG. 1 (a) to (c), a golf club head in an embodiment of the present invention comprises a head body 1 having a hollow structure which is formed by bonding (i) a metallic outer shell member 11 constituting a face, a sole and a shaft joint portion, and (ii) an FRP outer shell member 21 constituting a crown portion.

[0010]

A golf club head so structured enables improvement of the performance of golf clubs in terms of, among others, flying distance and direction by arbitrarily setting the center of gravity based on the combination of different types of materials or the shape, or by maximizing the head volume within the limited scope of the head weight (head mass). To bond the metallic outer shell member 11 and the

² “Hooking” herein means to attach or fasten with a hook.

FRP outer shell member 21, which are different types of materials, the present invention adopts the method for bonding to be described below.

[0011]

In the method for bonding shown in FIG. 2 (a) to (c), a bonding portion 11a of the metallic outer shell member 11 has a plurality of through-holes 13, and an FRP thread member 22 runs alternately on inner and outer surfaces of the metallic outer shell member 11. The thread member 22 can be, for example, a bundle of carbon fibers impregnated with epoxy resin. The thread member 22 before the epoxy resin is cured is flexible enough to easily pass through the through holes 13.

[0012]

Further, adhesive material is applied between the bonding portion 11a of the metallic outer shell member 11 and a bonding portion 21a of the FRP outer shell member 21. With this structure, the bonding portion 11a of the metallic outer shell member is bonded to the bonding portion 21a of the FRP outer shell member in a state where the thread member 22 is interposed along with the adhesive material between the metallic outer shell member 11 and the FRP outer shell member 21.

[0013]

The FRP outer shell member 21 and the FRP thread member 22 contain the same epoxy resin as each matrix. Therefore, when the FRP outer shell member 21 is bonded to the metallic outer shell member 11 with the adhesive material at their respective bonding portions and then the head body 1 is heated while appropriately applying pressure on the two bonding portions, the epoxy resin of the thread member 22 is cured to form one body with the epoxy resin of the FRP outer shell member 21, and the thread member 22 is tightly bonded to the FRP outer shell member 21 on the outer surface shown in FIG. 2 (a). Further, since the thread member 22 is cured and solidly maintains the shape of passing through the through-holes 13, the thread member 22 maintains the shape of hooking the metallic outer shell member 11 on the inner surface shown in FIG. 2 (a) which is opposite to the surface on which the adhesive material is interposed. Then, even if a force to detach the FRP outer shell member 21 is applied, the thread member 22 is not pulled out from the through-holes 13.

[0014]

Hence, with this form of bonding which causes the FRP thread member 22 to strongly connect the FRP outer shell member 21 to the metallic outer shell member 11 at a high bonding strength even if a metallic material used in the metallic outer shell member is not well-adhesive to the FRP outer shell member, it is possible to ensure durability as a golf club head and simultaneously improve the flying distance or other performance of golf clubs based on the combination of different types of materials.

[0015]

Depending on the size, shape or other factors of the bonding portion 11a of the metallic outer shell member 11 and the bonding portion 21a of the FRP outer shell member 21, a plurality of thread members 22 may be arranged on the metallic outer shell member 11 for bonding so as to further

enhance the bonding strength of the metallic outer shell member 11 and the FRP outer shell member 21.

[0016]

Further, the adhesive material may contain epoxy resin. An adhesive material containing epoxy resin is preferable because it is adhesive to the FRP outer shell member 21 and the FRP thread member 22 which similarly contain epoxy resin as each matrix.

[0017]

[...]

[0018]

[...]

[0019]

[...]

[Embodiments]

[0020]

As hollow golf club heads wherein a hollow head body is formed by bonding a metal outer shell member and an FRP outer shell member, Comparative Example 1 (conventional art) and Working Example 1 were made by different methods for bonding.

[0021]

Table 1 shows the results of assessing the durability of the bonding portions of these golf club heads. The results of the assessment are shown as index values with the value of Comparative Example 1 being 100. The higher the index value is, the more durable the bonding portion is as to the durability of the bonding portions.

[0022]

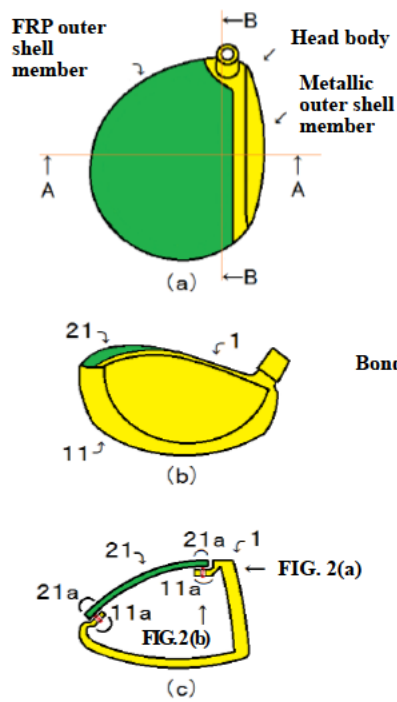
[Table 1]

Table 1

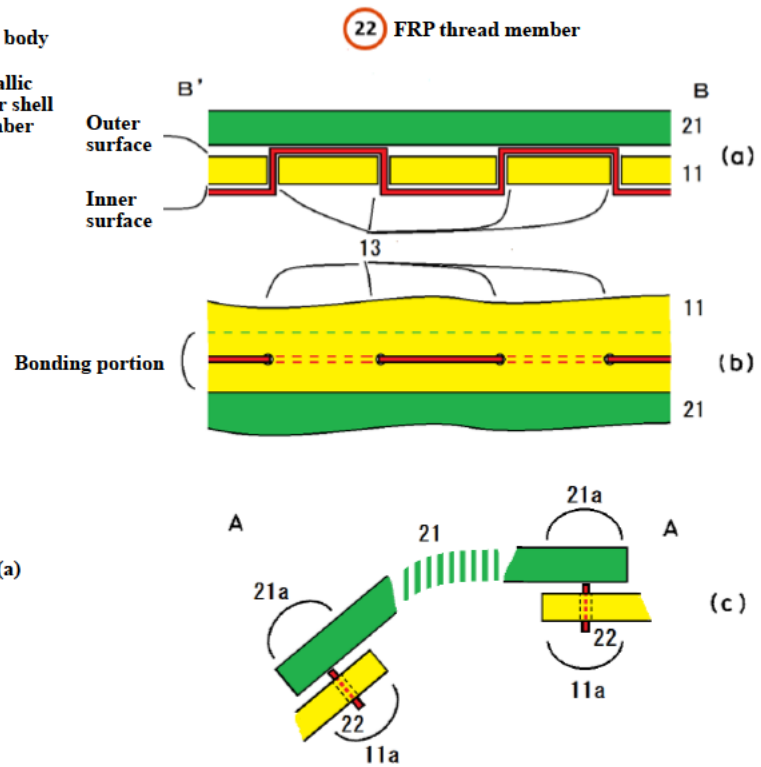
	Bonding method	Bonding strength
Comparative Example 1	Without through-holes and a thread member, and with adhesive material	100
Working Example 1	With through-holes, a thread member, and adhesive material	121

As is apparent from this Table 1, the golf club head in Working Example 1 exhibited a higher durability of the bonding portion, as compared to Comparative Example 1.

[FIG. 1]

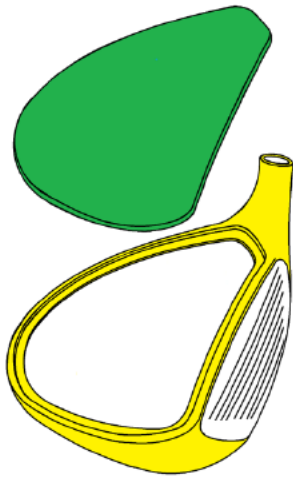


[FIG. 2]



- 1: Head body
- 11: Metallic outer shell member
- 11a: Bonding portion of the metallic outer shell member
- 13: Through-holes
- 21: FRP outer shell member
- 21a: Bonding portion of the FRP outer shell member
- 22: Thread member

[FIG. 3] (Conventional Art)



5. Summary of Written Amendment and Written Argument submitted during prosecution

- (1) What was claimed upon filing of the patent application was “FRP thread member maintaining a shape of passing through the plurality of the through-holes”; however, the Patent was granted after the claim was amended during prosecution to recite “FRP thread member maintaining a shape of passing through the plurality of the through-holes and running alternately on inner and outer surfaces of the metallic outer shell member.” Paragraph [0005] of the Specification was also amended according to this amendment to claim.
- (2) The Written Argument which Pony submitted simultaneously with the above amendment in response to the Office Action issued by the examiner states as follows:

“As to the identifying feature ‘a plurality of through-holes are provided in the bonding portion of the metallic outer shell member; the bonding portion of the metallic outer shell member is bonded to the bonding portion of the FRP outer shell member by interposing an FRP thread member along with adhesive material between the metallic outer shell member and the FRP outer shell member, the FRP thread member maintaining a shape of passing through the plurality of the through-holes,’ the examiner has found that ‘the structure of how the FRP thread member passes through the plurality of through-holes is unclear’; however, we believe that the amendment has made this point clear.”

6. Defendant's Product

(1) Figures and explanation thereof

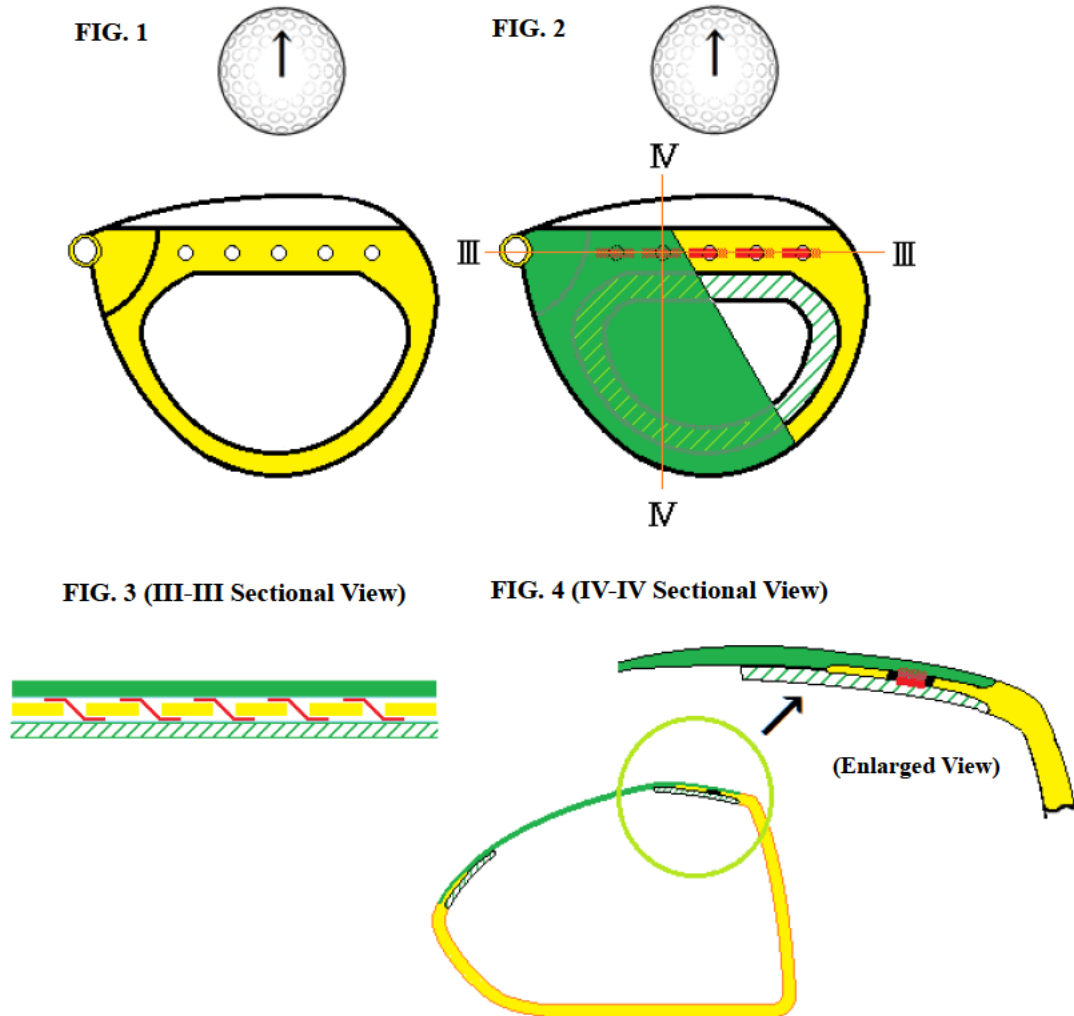


FIG. 1 is a plan view illustrating the hollow metallic outer shell member of the Defendant's Product; FIG. 2 is a partially broken plan view of the Defendant's Product; FIG. 3 is a sectional view taken along line III-III of FIG. 2; and FIG. 4 is a sectional view taken along line IV-IV of FIG. 2.

In FIG. 1, a metallic outer shell member 1 constitutes one body formed by a face surface portion 2, a bottom surface portion 3, a side wall portion 4, and an upper flange portion 5 that are made of titanium material; and the inner space of the metallic outer shell member surrounded by these portions constitutes a space 6. Five through-holes 7 are drilled in a face-side flange portion 5a of the flange portion 5, which is adjacent to the face surface portion 2.

As shown in FIG. 2 and FIG. 3, into each of these through-holes 7, short and small strips made of FRP impregnated with epoxy resin are inserted along with adhesive material, wherein each strip 8 is separated from adjacent strips 8, and the upper edge portion and the lower edge portion of each strip are placed along the upper surface and the lower surface, respectively, of the face-side flange portion 5a.

Arranged on the lower surface of the flange portion 5 is a ring-shaped FRP lower outer shell member 9 which covers the entire lower surface and also protrudes inward beyond the inner peripheral end of the flange. As shown in FIG. 3, this FRP lower outer shell member 9 is bonded integrally to the lower surface of the lower edge portion of the strips 8 at the face-side flange portion 5a.

Further, an FRP upper outer shell member 10 which covers the entire upper surface of the metallic outer shell member 1 and constitutes a crown portion of a golf club head is bonded to the upper surface of the flange portion 5 and is also integrally bonded onto the ring-shaped FRP lower outer shell member 9 so that these upper and lower outer shell members together form an FRP outer shell member. This FRP upper outer shell member 10 which constitutes a crown portion is bonded integrally to the upper surface of the upper edge portion of the strips 8 at the face-side flange portion 5a.

Thus, in the state where the strips 8 made of FRP impregnated with epoxy resin are interposed between the upper surface side of the face-side flange portion 5a and the FRP upper outer shell member 10, and between the lower surface side of the face-side flange portion 5a and the FRP lower outer shell member 9, and where the FRP lower outer shell member 9 and the FRP upper outer shell member 10 are bonded to the flange portion 5 of the metallic outer shell member 1, the hollow metallic outer shell member is put in a furnace to heat it under pressure and thereby cure the epoxy resin. The strips 8 so thermoset serve to solidly maintain the shape shown in FIG. 3.

As a result, as shown in FIG. 4, the FRP lower outer shell member 9 and the FRP upper outer shell member 10 are bonded to the metallic outer shell member 1 in a manner to sandwich the flange portion 5 of the metallic outer shell member 1 from the top and bottom; and at the face-side flange portion 5a, the FRP lower outer shell member 9 and the FRP upper outer shell member 10 are connected to form one body via the strips 8 made of FRP.

(2) Structure of the Defendant's Product

To sum up, the Defendant's Product has the following structure:

<a> a head body having a hollow structure and formed by coupling together a metallic outer shell

member 1 and fiber reinforced plastic (FRP) outer shell members 9 and 10 at the respective bonding portions of a flange portion 5 of the metallic outer shell member 1 and the FRP outer shell members 9 and 10;

 five through-holes 7 are provided in a face-side flange portion 5a of the metallic outer shell member 1;

<c> each of five short and small strips 8 made of FRP passes through a through hole 7, and the FRP strips 8 are aligned to form a line in a longitudinal direction of the face-side flange portion 5a so that:

each of the proximal portions of the FRP strips 8 to the shaft connecting part is placed on the upper surface side of the face-side flange portion 5a, and the FRP strips 8 penetrate the respective through-holes 7, and each of the distal portions of the FRP strips 8 is placed on the lower surface side of the face-side flange portion 5a;

the FRP strips 8 are interposed, along with adhesive material, between the upper surface side of the flange portion 5 of the metallic outer shell member 1 and the bonding portion of the FRP upper outer shell member 10, and between the lower surface side of the flange portion 5 of the metallic outer shell member 1 and the bonding portion of the FRP lower outer shell member 9 in the shape as shown in FIG. 3; and

by applying heat and pressure to the FRP outer shell members 9 and 10, the epoxy resin impregnated in each strip is cured together with the epoxy resin contained in the adhesive material so as to maintain the above shape of the FRP strips 8;

<d> the respective bonding portions of the flange portion 5 of the metallic outer shell member 1, and the FRP lower outer shell member 9 and the FRP upper outer shell member 10 are bonded; and

<e> each matrix of the FRP outer shell members 9 and 10, and the FRP strips 8 contains epoxy resin.

<f> A hollow golf club head characterized as above.

* Correspondence

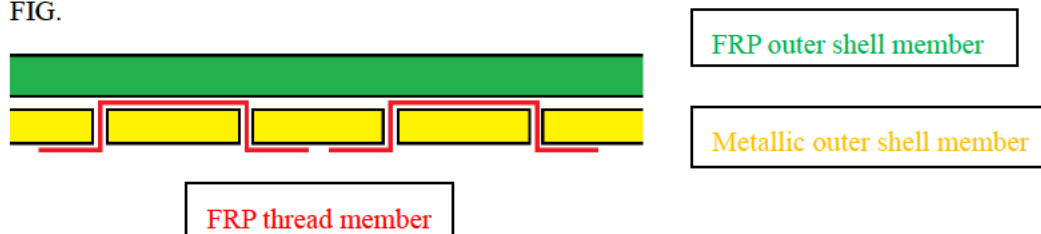
Terms of the Invention	Terms of the Defendant's Product
Metallic outer shell member	Metallic outer shell member 1
FRP outer shell member	FRP outer shell member 9, 10
Bonding portion of the metallic outer shell member	Flange portion 5 of metallic outer shell member 1
Bonding portion of the FRP outer shell member	Bonding portion of FRP outer shell member 9, 10
Through-hole	Through-hole 7

(3) Assertions of the parties over the effect of the Defendant's Product

Although each FRP strip passes only one hole (through-hole) in the Defendant's Product, the Plaintiff asserts infringement under the doctrine of equivalents for the reason that the Defendant's Product provides a sufficient effect of hooking equivalent to that of the Invention because even each strip that passes through only one hole works to solidly maintain the shape by thermosetting of the epoxy resin.

The Plaintiff further asserts that the infringement under the doctrine of equivalents is supported by the fact that even a product wherein an FRP thread member passes through only two through-holes, as shown in FIG. below, also falls within the technical scope of the Invention, but the bonding strength of the Defendant's Product is still higher than such a product working the Invention.

FIG.



On the other hand, the Defendant asserts that infringement under the doctrine of equivalents does not apply to the Defendant's Product on the ground that the Defendant's Product, wherein each of the five short and small FRP strips passes through one hole only and is bonded only to part of the metallic outer shell member, does not offer a sufficient bonding strength because it is unable to tightly hook the metallic outer shell member when a force to detach the FRP outer shell member is applied, and therefore fails to provide an effect equivalent to that of the Invention.

7. Arguments of the parties over the issues

(1) Issue 1 (Whether the Defendant's Product satisfies Element C of the Invention)

(Arguments of the Plaintiff)

Since nothing in the Specification suggests that the "FRP thread member" needs to be a single member, it is correct to understand that the "FRP thread member" may comprise multiple thread members (i.e., a group of multiple threads).

The five strips 8 aligned to form a line in the Defendant's Product work as a group to constitute a "FRP thread member." Further, these strips pass through five through-holes 7 and are therefore regarded as "passing through the plurality of the through holes."

(Arguments of the Defendant)

According to the claim language, "passing through the plurality of the through-holes and running alternately on inner and outer surfaces of the metallic outer shell member" (Element C), as well as the descriptions of the Specification ([0004], [0005], [0011], and FIG. 2), the "thread member" in Element C is interpreted to mean a single long, thin and threadlike member which alternately passes through a plurality of through-holes. The fact that only the embodiment in FIG. 2 is the working example disclosed in the Specification also supports that the "FRP thread member" of the Invention is a single long, thin and threadlike member.

Therefore, the Defendant's Product wherein a single strip passes through only one through-hole does not satisfy Element C.

(2) Issue 2 (Whether infringement is found under the doctrine of equivalents)

(Arguments of the Plaintiff)

Infringement under the doctrine of equivalents should be found for the following reasons:

A. First requirement (non-essential part)

An essential part of a patented invention means a characteristic part which is described in claims and constitutes a unique technical idea that is not seen in prior art.

Given the statements of the Specification regarding the problem to be solved by the Invention ([0004]), background art ([0002]) and working example ([0022]), the essential part of the Invention shall lie in the feature to enhance the bonding strength between the metallic outer shell member and the FRP outer shell member by "interposing" an FRP thread member between them, having the FRP thread member pass through the through-holes provided in the metallic outer shell member, and then curing the FRP thread member to maintain the shape and thereby "hook" the metallic outer shell member. The feature of the FRP thread member passing alternately through multiple through-holes is non-essential part.

This is also evident from the fact that the Specification compares the bonding strength between

Comparative Example 1 “Without through-holes and thread member” and Working Example 1 “With through-holes, thread member,” and does not refer to the number of through-holes through which the thread member passes.

B. Second requirement (possibility to replace)

- a. Each strip 8 of the Defendant’s Product passes through a single through-hole and is bonded at a single point to the metallic outer shell member and the FRP outer shell member, respectively. After passing through a through-hole, each strip 8 is thermoset so as to maintain the shape of passing through the through-hole and tightly bond the metallic outer shell member and the FRP outer shell member via the strip. In this manner, the Defendant’s Product also fulfills “interposing” and “hooking.”
- b. According to claim1, the structure illustrated in the figure below also falls within the technical scope of the Invention because each FRP thread member does pass through a plurality of through-holes. Further, the bonding strength between the metallic outer shell member and the FRP outer shell member in the Defendant’s Product is equivalent to that between the metallic outer shell member and the FRP outer shell member in this figure.

Furthermore, the Defendant’s Product can be made by merely dividing each thread member in this figure into two pieces at the center of the part placed on the upper surface side (outer surface) of the metallic outer shell member and then turning either of the pieces into a different direction; which also obviously supports infringement under the doctrine of equivalents.

- c. The same effect can therefore be achieved even if a single thread member in Element C of the Invention is replaced by a plurality of strips 8 in the Defendant’s Product.



(Green: FRP outer shell member. Yellow: Metallic outer shell member. Red: FRP thread member.)

C. Third requirement (easiness to replace)

As at the time of manufacturing the Defendant’s Product, a person skilled in the art could have easily conceived of replacing the member passing multiple times through a plurality of through-holes in the metallic outer shell member, by a member passing only once through a single through-hole.

D. Fifth requirement (no intentional exclusion)

Since the amendment made by the Plaintiff was merely intended to clarify unclear descriptions of claims and overcome the reason for refusal (violation of clarity requirement), the Plaintiff is not objectively and externally regarded as having intentionally excluded the embodiment of the Defendant’s Product from the technical scope of the Invention.

As a side note, the statements in [0015] pointed to by the Defendant merely indicate that a plurality of thread members may be arranged, for example, in parallel, and do not describe the embodiment of the Defendant's Product.

(Arguments of the Defendant)

No Infringement under the doctrine of equivalents should be found for the following reasons:

A. No satisfaction of the first and second requirements

If the Invention changes its structure such that the FRP thread member does not pass through a plurality of through-holes, then it is unable to solve the problem which is supposed to be solved by the Invention ([0003], [0004]) due to the lack of sufficient bonding strength. In the Defendant's Product where a strip passes through a single through-hole only, it is impossible to secure sufficient bonding strength without an FRP lower outer shell member. Therefore, an FRP lower outer shell is provided to ensure the bonding strength. Thus, the structure of having a single FRP thread member pass through a plurality of through-holes can be regarded as the essential part of the Invention, which cannot be replaced by the structure of the Defendant's Product wherein an FRP lower outer shell member passes through a single through-hole only.

B. No satisfaction of the third requirement (easiness to replace)

For a person skilled in the art, it is obvious that the bonding strength deteriorates if the FRP thread member is replaced by five short and small strips. Thus, he/she would not easily conceive of replacing the thread member of the Invention by short and small strips as in the Defendant's Product.

C. No satisfaction of the fifth requirement (The structure of the Defendant's Product was intentionally excluded)

The Plaintiff amended the claim language from "FRP thread member maintaining a shape of passing through the plurality of the through-holes," as claimed upon filing of the patent application, to "FRP thread member maintaining a shape of passing through the plurality of the through-holes and running alternately on inner and outer surfaces of the metallic outer shell member."

Meanwhile, the Specification states "a plurality of thread members 22 may be arranged on the metallic outer shell member 11" at [0015]; which represents the embodiment of the Defendant's Product. This means that the Plaintiff purposely did not describe in claims, such embodiment disclosed in the Specification. The structure of the Defendant's Product is therefore a structure intentionally excluded by the Plaintiff.