Patents Act 1977 **Opinion Number** **13/25**

OPINION UNDER SECTION 74A

Patent	GB 2557561 B
Proprietor(s)	Kollmorgen Corp.
Exclusive Licensee	
Requester	Thomas Owen Hutchinson
Observer(s)	Elkiner IP Ltd for the proprietor and Thomas Owen Hutchinson
Date Opinion issued	04 February 2026

The request

1. The comptroller has been requested to issue an opinion as to whether Patent GB2557561B is invalid on the basis of lack of novelty, lack of an inventive step and having added matter according to Sections 2, 3 and 76 of the Act.

2. The Patent was filed via the PCT route on 7th October 2016 and published as WO2017/062824A1 claiming priority from a US filing dated 9th October 2015. It was granted in the UK on 1st November 2021.

3. The prior art documents cited in the request are:

D1 US 2005 212 377 A1 *published 29/9/2005*
D2 US 2013 065 424 A1 *published 14/3/2013*
D3 DE 102 22 324 A1 *published 27/11/2003*
D4 DE 10 2009 054 899 A1 *published 22/6/2011*

D5 Advertising Brochure "MAG-MATE Connector With Multispring Pin" by Tyco Electronics Corporation, downloadable from https://datasheet.octopart.com/1247004-2-TE-Connectivity-datasheet-14918754.pdf *published 2013*

D6 Print-out of the web page https://www.edn.com/connectors-multispring-pin-eliminates-soldering/ *published 19/1/2013*

D7 DE 10 2014 201 488 A1 *published 30/7/2015*

The requestor makes reference to English machine translations obtained from the EPO 'espacenet' website for the German language patent documents D3, D4 and D7.

4. The publication date of the datasheet D5 is asserted based on two things: Firstly, a portion on the bottom of each of the two pages with '01/2013' and '© 2013 Tyco'; And secondly on document D6 which refers to a page of an online website/magazine 'EDN' that has an article about '*the Mag-Mate connector'*, including an image that can be found in D5. This page has a stated publication date of 19 January 2013 and has an online comment dated 23 January 2013. The proprietor does not seem to argue against the alleged publication date in their observations. I am content to accept that document D5 was made publicly available before the filing of the priority document in 2015.

Observations

5. Observations were received from Elkiner IP Ltd on behalf of the proprietor and observations in reply were received from the requestor Thomas Owen Hutchinson.

6. An issue was raised by the proprietor regarding document D1, which was cited by the international search report, which I discuss below.

7. I also note that the requestor, in the observations-in-reply, expanded on some of the original arguments of the request. I will discuss below whether I should allow these to be included in this opinion.

Matters to be considered by this Opinion

8. The proprietor notes that D1 was considered both by the international Search Authority when producing the IPRP and by the UK Examiner when the amended claims were re-examined. They argue that I should not provide an opinion regarding arguments (in section 7.1 of the request) that use D1.

9. The primary argument provided in the request uses a combination of D1 and D5 to show a lack of inventive step. An alternate one uses D1 in combination with any of docs D2, D3, D4 or D7. A further argument is for a lack of novelty on the basis that D5 might be considered 'incorporated by reference' in D1. A final argument is lack of inventive step given D1 as D5 would be common general knowledge.

10. While document D1 was raised pre-grant, none of documents D2 to D7 where raised. Therefor I consider that the arguments presented in the request using D1 are new arguments that were not considered pre-grant. Thus I will given my opinion on validity based on D1 when considered along with one or more of the other documents.

11. In the observations in reply, when discussing added matter in claim 11, the requestor mentions a possible construction of claims 1 and 11 where the 'prongs' introduced in claim 11 might be considered as a specific type of 'arms' found in claim 1. They argue that such a construction would also not be supported. Such a construction is

not argued in the original request. As this is a new argument, I will disregard it in regard to the construction of claims 1 and 11 when considering added matter.

The Patent

12. The invention is about a method of assembling circuitry with stator windings of an electric motor. Figure 1 below shows an exploded diagram of the stator where a PCB 130 connects to each of the winding segments via a pair of connector elements 122, 124. Each segment comprises an assembly about which a coil of insulated wire is wrapped, with the two wire ends arranged at an upper insulator 110 of the assembly. This insulator has two pockets 116, 118 for receiving a first terminal of the pair of connectors. The opposite second terminal of each connector is received in a hole 132, 134 of the PCB. The PCB has circuit traces that distribute the input phase voltages from wires 142,144,146 to the required coils of the stator via the terminal holes. Each connector is arranged such that the opposing pair of electrical terminals make electrical contact between the PCB and coil wire without requiring any additional processes, such a soldering. By not needing soldering, the assembly method is said to be simplified and faster and avoids problems of poor quality or broken solder joints.

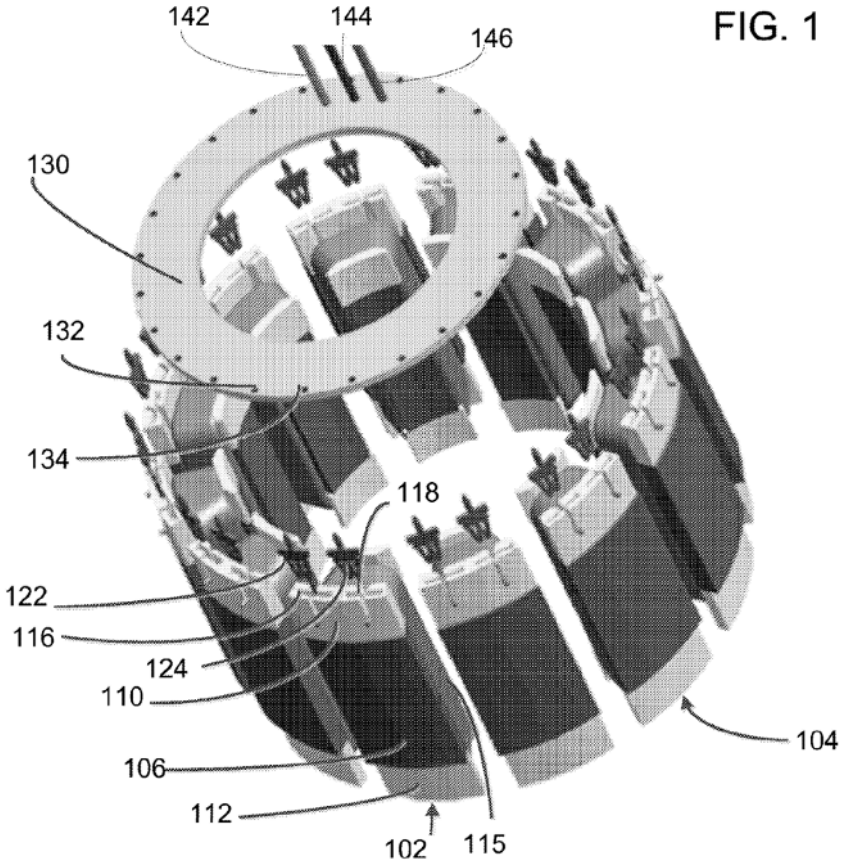


FIG. 1

13. Detail of the connector is shown in figure 3 below where the connector 202 has been inserted into a insulating pocket 210 of the stator coil assembly, but has not yet been connected to the PCB. The lower first terminal acts as a insulation displacement connector, whereby the insulated wire 220 is held such that a pair of terminal prongs 214, 216 pierce the wire insulation to electrically contact the metal core of the wire. The first terminal and pocket are shaped so that when the connector is inserted, it slides down past the wire, with the prongs held in the correct position relative to the wire to form the electrical contact.

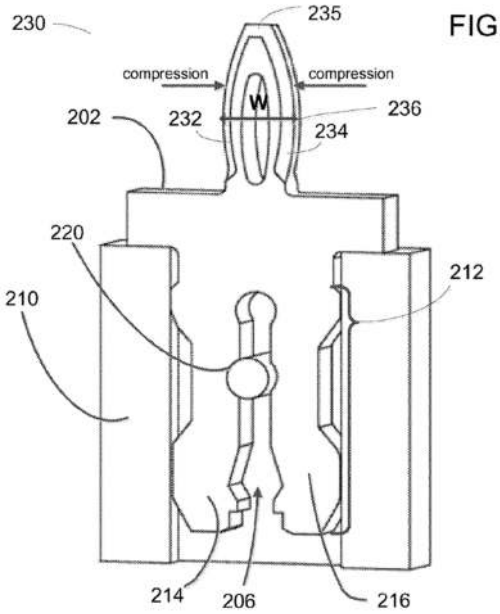


FIG. 3

14. The second terminal at the opposite end of the connector is shaped so that is can be compression fit into a conductive hole of the PCB by a pair of spring-like terminal arms 232, 234. The method has the connectors first inserted into the coil pockets so that the array of second terminals can be push fit together into the overlying PCB in one step. Each connector is preferably formed as an integral conductive metal part.

Claim construction

15. As a first step in determining the validity of the patent I must correctly construe the claims. This means interpreting them in the light of the description and drawings as instructed by Section 125(1). In doing so I must interpret the claims in context through the eyes of the person skilled in the art. Ultimately the question is what the person skilled in the art would have understood the patentee to be using the language of the claims to mean. This approach has been confirmed in the decisions of the High Court in *Mylan v Yeda*[1] and the Court of Appeal in *Actavis v ICOS*[2].

16. Section 125(1) of the Act states that:

> *For the purposes of this Act an invention for a patent for which an application*

[1] *Generics UK Ltd (t/a Mylan) v Yeda Research and Dev. Co. Ltd & Anor* [2017] EWHC 2629 (Pat)
[2] *Actavis Group & Ors v ICOS Corp & Eli Lilly & Co.* [2017] EWCA Civ 1671

has been made or for which a patent has been granted shall, unless the context otherwise requires, be taken to be that specified in a claim of the specification of the application or patent, as the case may be, as interpreted by the description and any drawings contained in that specification, and the extent of the protection conferred by a patent or application for a patent shall be determined accordingly.

17. And the Protocol on the Interpretation of Article 69 of the EPC (which corresponds to section 125(1)) states that:

> *Article 69 should not be interpreted in the sense that the extent of the protection conferred by a European patent is to be understood as that defined by the strict, literal meaning of the wording used in the claims, the description and drawings being employed only for the purpose of resolving an ambiguity found in the claims. Neither should it be interpreted in the sense that the claims serve only as a guideline and that the actual protection conferred may extend to what, from a consideration of the description and drawings by a person skilled in the art, the patentee has contemplated. On the contrary, it is to be interpreted as defining a position between these extremes which combines a fair protection for the patentee with a reasonable degree of certainty for third parties.*

18. There are three independent claims which are :

> *1. A stator of an electric motor comprising:*
> *a plurality of segments, each of the segments including a tooth having magnetically-permeable material, an electric coil surrounding the tooth, and at least one insulator;*
> *a plurality of connectors, each connector including a first terminal providing two arms adapted to pierce an insulation covering of an electrical wire and electrically connect therewith, and a second terminal providing an elongate element, wherein the first and second terminals are integrally formed from a conductive material;*
> *and a circuit board coupled to input power lines and including apertures adapted to receive the second terminals of the plurality of connectors by compression fit;*
> *wherein the circuit board is coupled to the electric coils of each of the plurality of segments when the second terminals are received in the apertures.*
>
> *12. A method of assembling a motor stator including a plurality of segments, each of the plurality of segments having wound electrical coils, the method comprising:*
> *spatially arranging the plurality of segments for assembly;*
> *coupling a plurality of connectors to the plurality of segments, at least one connector being coupled per segment, each of the plurality of connectors comprising a first terminal providing two arms adapted to pierce an insulation covering of the electrical coil and electrically connect therewith, and a second terminal providing an elongate element, wherein the first and second terminals are integrally formed from a conductive material;*
> *and press fitting a circuit board onto second terminals of the plurality of*

connectors, the circuit board coupling the electrical coils of the plurality of segments to input power lines through the plurality of connectors.

21. An electrical connector for connecting a circuit board to a segment of a stator of an electric motor, the electrical connector comprising:
a first terminal providing two arms adapted to pierce an insulation covering of an electrical wire and electrically connect therewith; and
a second terminal providing an elongate element providing a compression fit with an electrically conductive receptacle;
wherein the first and second terminals are integrally formed from a conductive material.

19. During prosecution, claims 1 and 12 were amended, and claim 21 was introduced; The original claim set had no claims directed to the connector itself.

20. I do not have any significant issues construing independent claims 1 and 12. I also do not see specific problems of construction being raised in the observations or observations in reply regarding these claims.

21. I note that claim 21 is construed as only being suitable for use in connecting a circuit board to a stator segment. In particular I note that there is nothing in claim 21 about any particular size and shape of the motor, the stator or of the circuit board nor is there anything explicitly about how the assembly of motor stator, the wire, the connector and PCB might be aligned or arranged. I note that claim 21 does not explicitly say what the 'electrical wire' is part of. I think it is implicit that it is a wire associated with the stator of the motor, but I do not think anything more about the stator is implied.

22. Also, claim 21 is not explicitly clear as to what the receptacle is. I think it is implicit that this is related to making electrical contact with the circuit board, but I do not think that any other detail of the receptacle is implied. Therefor I am construing the term '*providing an elongate element providing a compression fit with an electrically conductive receptacle'* as an element suitable for compression fit into a conductive receptacle associated with a circuit board. Whilst the embodiments show this receptacle as a conductive hole through a circuit board which connects to a circuit trace of the board, I think receptacle should be construed broader to include holes that might, for example, be part of an electrical connector which is associated with the circuit board.

23. Another issue is noted regarding claim 21. There does not seem to be clear explicit support for the final feature of the two terminals being '*integrally formed of a conductive material*'. I can find no reference to '*integrally formed'* in the description. I note that figure 3 is suggestive that the connector may be integrally formed and note that there is nothing to suggest that such an integral connector would not work or not be suitable. I also note that while paragraph 29 does state that the prongs of the first terminal are '*made of or including a conductive material'*, this is not explicitly stated for the arms of the second terminal. I think that it is implicit that the second terminal must be conductive. What is less clear, is if the '*integrally formed'* feature is implicit. This issue was not raised in the request or the observations. At least for the purposes of this opinion, I will assume that the feature is implicitly part of the patent specification and proceed on the assumption that claim 21 is supported.

24. I also need to address the construction of dependant claim 22 that was introduced by amendment along with claim 21 and reads:

> *22. The electrical connector of claim 21, wherein the second terminal is adapted to be inserted into an insulator, wherein the insulator comprises an aperture adapted to support the electrical wire.*

25. When arguing for added matter, the request notes that in the embodiments it is the first terminal of claim 21 that is inserted into an insulator, not the second terminal. I agree that there is a problem with claim 22. I note in particular figure 3 shown above which has the terminal comprising the ICD as fittings in pockets 116, 118 of the upper insulator 110 and has the push-fit terminal extending outside the pocket. The equivalent to the ICD terminal in claim 21 is the first terminal, not the second, which is equivalent to the push-fit PCB terminal. My conclusion is that I should construe claim 22 at face value, and accept that it refers to the second terminal, despite the lack of support in the description.

Novelty

26. Sections 2(2) and 2(3) of the Patents Act 1977 state:

> *2(2). The state of the art in the case of an invention shall be taken to comprise all matter (whether a product, a process, information about either, or anything else) which has at any time before the priority date of that invention been made available to the public (whether in the United Kingdom or elsewhere) by written or oral description, by use or in any other way.*
>
> *2(3). The state of the art in the case of an invention to which an application for a patent or a patent relates shall be taken also to comprise matter contained in an application for another patent which was published on or after the priority date of that invention, if the following conditions are satisfied, that is to say -*
>
> *(a) that matter was contained in the application for that other patent both as filed and as published; and*
>
> *(b) the priority date of that matter is earlier than that of the invention.*

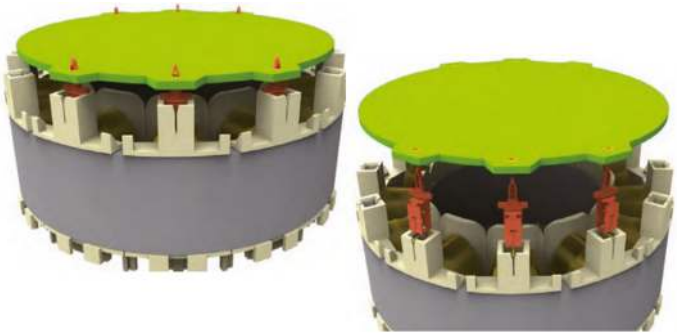
27. The main novelty arguments presented are directed to claim 21 on the basis of documents D2, D3, D4, D5 and D7. I note that the proprietor's observations have no specific rebuttal regarding the novelty of claim 21. The request also argues that claim 22, dependant on claim 21, lacks novelty given those same documents. I will go on to address this if I find claim 21 lacks novelty.

Novelty of claim 21

D5 – the MAG-MATE datasheet

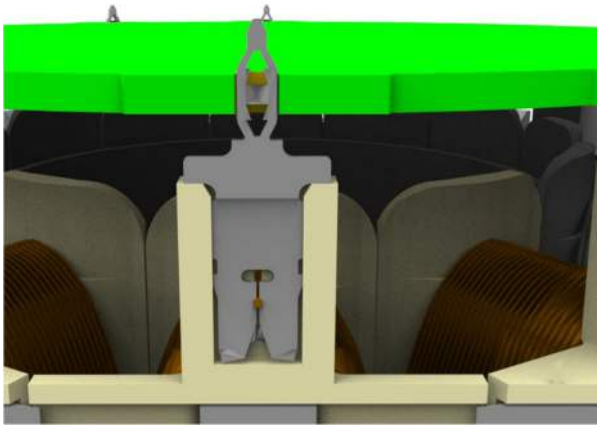
28. This presents a connector for use in an array for connecting an overlying PCB to stator coils of a motor. The data sheet refers to the following figure at the bottom of the first page with the text: '*Applications : Any motor or magnet wire application that*

requires a direct PCB connection' :



Detail of the connector when installed is shown in the figure at the top of the page (see below) with an upper terminal for press-fit into a conductive hole of a PCB and a lower terminal comprising two arms to act in an 'insulation-displacement' manner. The top paragraph adjacent that figure states:

> *TE Connectivity introduces the MAG-MATE connector with Multispring pin, a combination of two key technologies that eliminate the customer's need to solder in a motor connection. The MAG-MATE connector with Multispring pin provides the ability to directly connect magnet wire to a PCB with no solder. Traditionally, the process is to solder magnet wire to a pin, assemble the PCB to the pin, and then solder the PCB to the pin. Not anymore! This unique product allows solderless magnet wire termination in the IDC (Insulation Displacement Connection) at the bottom and solderless PCB termination through press-fit Multispring pin on the top.*

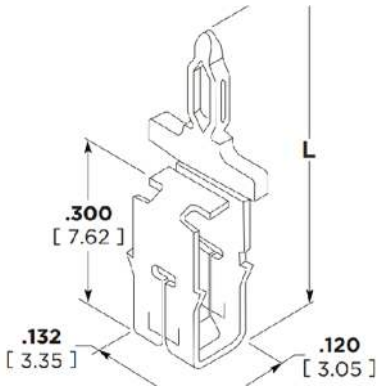


29. The request argues D5 has all of the features required by claim 21. While the observations have no specific rebuttal regarding the novelty of claim 21, they do discuss D5 elsewhere in regard to obviousness of claim 1. The observer argues that D5 does not show two arms both piercing a conductor insulation and connecting to the conductor, and argues that D5 does not show the 'multi-spring pin' as being integrally formed.

30. Firstly, I think that the skilled reader of D5 would find that the IDC bottom end does act to pierce the insulation, because this is necessarily what the action of displacing the insulator does, and secondly I think that they understand that there must be an

electrically connection to the conductive core of the wire. I think that it is reasonable for the skilled reader to view the IDC as comprising a pair of arms that act together. I therefore disagree with the proprietor on this point.

31. Secondly, it is less clear from D5 that the '*first and second terminals are integrally formed*'. D5 does state that the materials of the connector are '*Tin over Copper Alloy'* on page 2, which the request asserts, when considered with the drawings of D5, shows the terminals are integrally formed. D5 does not explicitly describe how the connector is formed. I note the other drawings in D5 which show the pin terminal below and which is described as having '*high reliability due to stored energy*' and '*larger hole tolerances compared to the use of a solid pin'*:



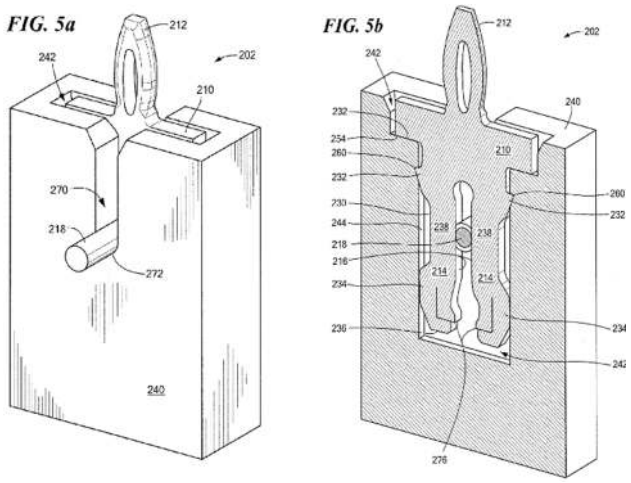
I think that, while the skilled reader might consider the connector shown could be formed substantially as an integral metal body, possibly by some kind of stamping and folding process, there is some doubt regarding the internal structure of the pin. The pin shown appears to have some kind of internal folded spring element – which might be the 'multispring' part of the pin. I think that the skilled reader would have some doubt that the complete connector shown is integrally formed and, on the balance of probabilities, I agree with the proprietor on that point.

32. Claim 21 requires that the second terminal provides *'an elongate element providing a compression fit with an electrically conductive receptacle'* and that the first and second terminals are integrally formed. It is clear that D5 shows a pin that has such an element, but it seems the pin may comprise separate parts assembled.

33. Thus I conclude that D5 does not show claim 21 lacks novelty.

D2 US 2013065424 A1

34. Document D2 shows an IDC connector as such, and does not explicitly show any particular use cases other than showing the connector along with an insulated wire. In particular while there is no mention of connecting to wire coils of a motor, there is reference to '*magnet wire'* in paragraphs 35 and 42. The document is focussed on the details of the insulation displacement terminal, and makes very little reference to the 'contact portion 212' which paragraph 30 describes as *'… may be a press-fit terminal as illustrated or any other suitable termination*'. Figure 5b of D2 shows the connector in an isometric cutaway of the assembly of figure 5a :



35. The connector shown comprises a terminal 200 located in an insulating housing 240 that has a slot 242 receiving part of the terminal and a slot 270 receiving an insulated wire 218 at the bottom. The housing mechanically retains the terminal and wire in place relative to each other.

36. In relation to the requirement of claim 21 for the terminals to be 'integrally formed', the request notes that paragraph 31 of D2 that states:

> *The IDT 200 is formed as a single unitary piece of a spring based metallic alloy, such as by stamping.*

37. The request states that all of the features of claim 21 are present, in particular arguing:

> *Furthermore, [the claim 21] feature "for connecting a circuit board to a segment of a stator of an electric motor" merely constitutes a statement of purpose, which does not limit the scope of protection. The connector disclosed in D2 serves the same purpose …*

38. The proprietor (in relation to inventive step) admits that does D2 show a unitary piece forming an IDC connector, but argues the following regarding D2:

> *D2 discloses only a general IDC concept and is unrelated to any stator application. The reference contains no description or illustration of the press-fit terminal configuration and no disclosure of circuit-board coupling.*

39. I find the two arms of the ICD of D2 do pierce insulation and electrically connect to the wire core in the manner required by the first terminal of claim 21. Regarding the second terminal, the push-fit terminal of D2 is clearly '*an elongate element'* and I consider '*compression fit'* and *'push fit'* to be equivalent terms in the art. Thus I think that D2 shows a terminal suitable for '*providing a compression fit with an electrically conductive receptacle'*.

40. I find that the connector in D2 does have two terminals that have the features required of the first and second terminals of claim 21. It is also clear that the terminals are integrally formed of a conductive material. The question remaining is

whether D2 provides a connector suitable for *'… connecting a circuit board to a segment of a stator of an electric motor…"*. As I discussed earlier, I think that this should be construed broadly, and I think the skilled reader would find it is implicit that the terminal of D2 could be used to provide such a connection to a circuit board.

41. I therefore find that D2 shows claim 21 lacks novelty.

D3 DE 10222324 A1

42. D3 describes a connection contact element 1 that has a section 2 for a circuit carrier and section 3 for an electrical cable as shown in figure 1 below. The request notes paragraph 12 which states:

> *The section 2 of the connection contact element 1, which serves for the connection to the circuit carrier, is designed as a press-fit contact 2*
> *... the widened region of the press-in contact 2 is compressed in a bore in the circuit carrier*
> *… a conductive connection is ensured between the connection contact element 1 and the circuit carrier.*

And they also note paragraph 13 which states:

> *… the insulation displacement contact 3 has a slot which tapers from its opening to its end. This slot is formed by two opposing cutters which cut an insulation of the cable and cut into the electrical conductor of the cable. …*

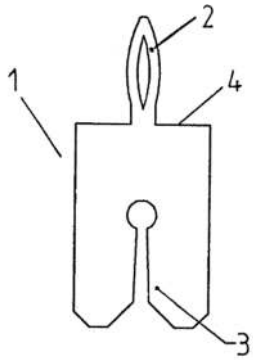


Fig. 1

43. The request asserts that figure 1 shows the contact element as a single piece and that it must, given the described purpose, be formed from a conductive material. Looking at the translated description of D3, there is no explicit mention of how the element 1 is made, or of what materials.

44. Taking into account the way the element of D3 is used, there at least must be an electrical connection between its opposing terminal ends. There is nothing in the figure that suggests the element is assembled from multiple parts.

45. Whilst in relation to inventive step, I note that the observations refer to D3 as *'This device therefore combines the basic IDC and press-fit concepts in one metallic piece'* .

46. I find that D3 does show a suitable connector with the required terminals as claim 21 requires. However, I do not find anything in D3 that explicitly says it is formed as an

integral element from a conductive material. I think that the skilled reader might well consider that the connector shown could be formed substantially as an integral conductive body, such as from metal. On the balance of probabilities, I think the skilled reader would find it implicit that D3 is formed in that manner.

47. I conclude that, by both explicit and implicit disclosure, the document D3 shows claim 21 lacks novelty.

D4 DE 102009054899 A1

48. D4 describes a lead-frame suitable for connection of a wire to a circuit where an example lead frame element is shown in figure 1 below. The request refers to figure 1 and to paragraphs 1, 3, 6, 30, and 35 as disclosing the features of claim 21. The lead frame is said in paragraph 30 to have *'… four press-in pins 1 and a double insulation terminal 4 …'* . Paragraph 6 states *'The contacting element is preferably at least partially, in particular completely, made of electrically conductive material.'* and in paragraph 35 it is said that *' All contacting elements are designed as a single piece …*' .

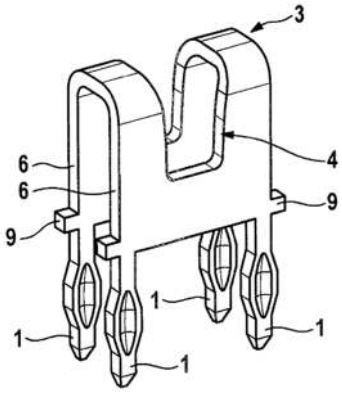


Fig. 1

49. However, I consider that the paragraphs highlighted in the request do not provide an explicit disclosure of insulation terminal 4 having two arms that act *to 'pierce an insulation covering of an electrical wire'* as the claim requires. Looking at the rest of D4 I note the following paragraphs:

> *[0008] At least one insulation terminal is preferably designed in such a way that it can receive and electrically contact or contact electrical conductors with diameters of more than 1.5 mm, especially more than 2 mm. The specification of the diameter refers particularly preferably to the pure conductor or to the stranded wire of the conductor, without insulation.*
>
> *[0014] The at least one insulation clamp, especially the insulation terminals of the double insulation clamp, are appropriately designed essentially in a U-shape.*
>
> *[0034] Fig. 5 shows an example of an electrical device for an active steering system. … Electric motor 1 is connected to circuit board 15 with its electrical conductors 5 by means of a bent contacting element, each comprising a double insulation terminal 4 .*

Thus there is an oblique reference to conductors with an inner conductive diameter, implying an outer insulator, and to the terminal as a 'clamp'. I do not think these passages are enough to be a disclosure of a terminal with arms piercing insulation of a wire however.

50. If instead I look at the other embodiment in D4, as figure 4 below shows, I find the following description:

> *[0033] Fig. 4 shows an alternative embodiment of a flat contacting element in which lead frame 3, adjacent insulation terminals 2 and press-in pins 1 are also connected to each other in a single piece. This contacting element also has recesses 13 so that the cutting edges of the inner insulation terminals, especially the two cutting edges of the middle insulation clamp, are movable to a certain extent or flexible for contacting an electrical conductor that is not shown.*

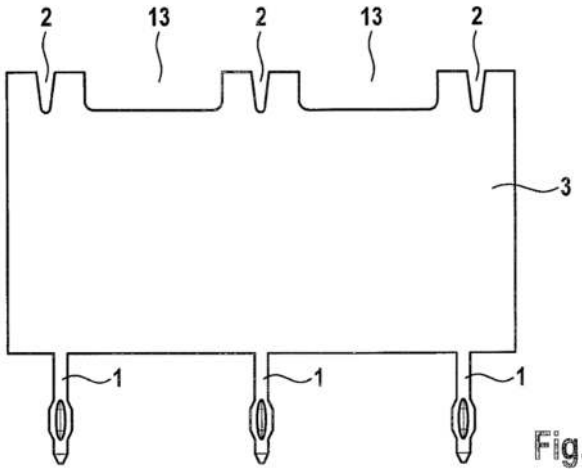


Fig. 4

This embodiment is a little closer to a disclosure of the first terminal of claim 21. While it refers to a pair of cutting edges that contact the conductor, though it does not explicitly state that insulation surrounding the conductor is cut to make electrical contact to the inner conductive core. However, I think that the skilled reader would understand that this cutting action could be of insulation surrounding a wire.

51. Whilst in relation to inventive step, I note that the observations state that *'D4 presents a planar leadframe contact having both a press-fit pin and an IDC clamp.'* .

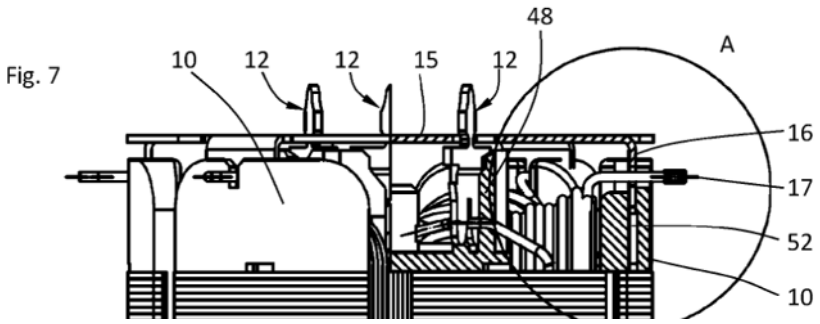
52. In conclusion, I consider that it's is explicit that D4 shows a connector suitable for use with a circuit board with a compression fit (second) terminal and a (first) terminal with two arms where the two terminals are integrally formed from a conductive material. I consider that, on the balance of probabilities, that it is implicit that the terminal arms are adapted to pierce an insulation covering of a wire and connect therewith. Thus D4 shows that claim 21 lacks novelty.

D7 DE 102014201488 A1

53. D7 describes a motor assembly with connectors 12 to phase winding ends and a combined connector 15 to neutral point winding ends, these windings forming the coils of the motor stator. The phase ends are located towards the middle of the

motor, with the neutral ends towards the outer circumference. The example motor has six stator coils arranged with pairs of coils connected together in parallel with a common connector 12, so that there are three connectors 12 used in total.

54. The request highlights a portion of figure 7, which shows a side view of the motor assembly, and I reproduce to top half of the figure below:



The request quotes the end of paragraph 42:

> *The phase connection means 12 are provided with press-fit contacts for electrical connection to a printed circuit board 14 (see Figs. 4, 5 and 16) and with insulation displacement contacts for connection to phase winding ends 13.*

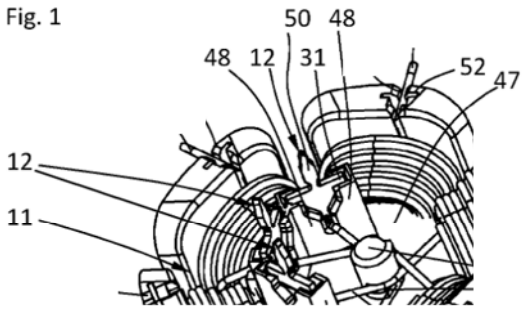
which is in relation to isometric figure 1 and I note that the paragraph also says:

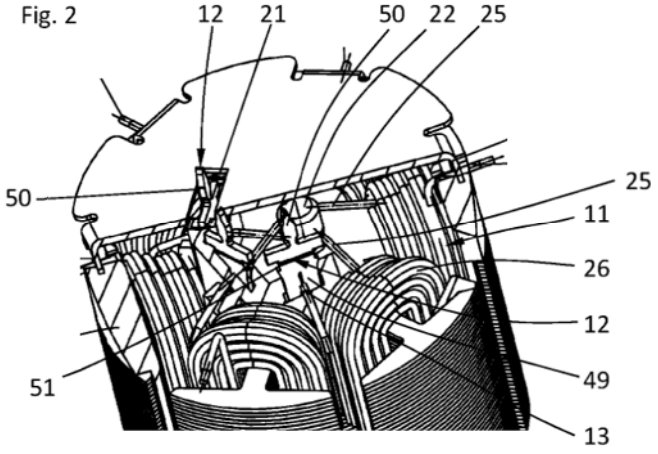
> *Within the space occupied by the stator winding 11, the insulating body 10 has a disc-like region 47, from which slotted shaft walls 48 protrude, which form pockets 31 for receiving phase connection means 12.*

Paragraph 43 then describes connectors 12, in relation figures 1 and 2, as

> *… consist of a press-fit contact portion 50, a insulation displacement contact portion 49, and a barbed retaining portion 51 for clamping in the pocket 31…*

I reproduce isolated portions of figure 1 and 2 below where I have removed irrelevant labels to better highlight connector 12:





57. In relation to inventive step, the observations state that in D7: *'There is no indication of the IDC/press-fit integration'*. I partly disagree with this. While the figures of D7 are rather busy, and there is no drawing of the connector 12 by itself outside of the assembly, I think its clear that the press-fit contacts 50 and insulation displacement contacts 49 as located at opposite ends of the connection means 12. So I think that means 12 does have an IDC wire terminal and a press-fit terminal.

58. The request uses figure 7 of D7 as showing that means 12 is '*a single piece connection'* and argues '*it is implicitly disclosed that this connector is formed from a conductive material, otherwise, no electrical connection could be established.* '.

59. I think it is implicit that both contacts 49 and 50 must be conductive given how they are described in use and that they are electrically connected together. I can find no part of D7 that explicitly states means 12 is integrally formed and of a conductive material. I also can find nothing in D7 that suggest that means 12 is an assembly of multiple parts. I find myself with a similar question here as I did for document D3 above, would the skilled reader think D7 implies that means 12 is formed as an integral conducive part ? On the balance of probabilities, I think that they would expect means 12 to be an integrally formed part.

55. I conclude that, by both explicit and implicit disclosure, the document D7 shows claim 21 lacks novelty.

Novelty of claim 22

56. Claim 22 is dependant on claim 21 and reads:

> *22. The electrical connector of claim 21, wherein the* ***second*** *terminal is adapted to be inserted into an insulator, wherein the insulator comprises an aperture adapted to support the electrical wire.*

As I have found that documents D2, D3, D4 and D7 each show claim 21 lacks novelty, I will go on to consider the novelty of claim 22.

57. The request argues that claim 22 lacks novelty in the following words:

> *This is because its characteristics merely represent functional specifications regarding the extent to which the second terminals must be adapted.*
>
> *Moreover, the mentioned insulator in claim 22 is not comprised by the claimed electrical connector. Therefore, a suitable insulator that meets the required features of claim 22 can always be found for the connectors disclose in D2, D3, D4, D5, and D7.*

I agree that the claim should be construed as understanding that the insulator is not part of the wire, but is a separate body used with the connector and wire. Further it seems that the requestor, regarding novelty, is suggesting that lack of novelty could be found depending on a specific way of construing claim 22: by replacing the

highlighted word **second** with the word **first**. Doing so would result in claim 22 implying that the insulator provides for alignment of the supported wire and the arms of the first terminal, which would concur with the embodiments of the Patent (eg figure 3).

58. Document D2 shows in figures 5a and 5b (reproduced above) for example how the IDT 202 is used with an insulating connector housing 240 that is shaped with a first U-shaped slot 270 that receives and supports a wire 218 at the bottom of the U. The housing subsequently receives the connector in a second slot 242 so that it is aligned with the wire. The connector is arranged so the arms 214 of the IDT portion are in the slot, with the press-fit portion 212 extending outside the slot. Thus, if the matter of claim 22 is construed to be about the first terminal, then it would be disclosed by D2.

59. If I was to accept the suggested construction, then I would necessarily find that claim 22 lacks novelty given at least document D2. However, as I explain elsewhere in this opinion, I think it would be wrong for me to consider the skilled reader to be correcting for mistakes when trying to construe the claims.

60. If I take the construction of claim 22 at face value (as I think I should) then claim 22 requires the second, PCB push-fit, terminal of a connector to be inserted into an insulator body and for that body to also have an aperture for the wire. On that basis I find that all of the figures of Document D2 teach away from the claim as the push-fit terminal 212 is shown outside of the housing 240.

61. Looking at D3, there is nothing disclosed about the use of an insulating body for the wire and/or connector, and so D3 does not disclose either construction.

62. Looking at D4, I note for example that figure 2 shows an embodiment where, the PCB push-fit terminal is specifically not carried by the plastic frame 10, equivalent to insulator of claim 22. Instead D4 shows the push-fit terminal outside of the plastic frame.

63. Looking at D7, the push-fit terminal end of the connector is consistently shown extending away from the insulator pockets of the motor which carry the motor wires.

64. Thus I find documents D2, D4 and D7 each teach away from claim 22 when it construed at face value to mean the ‘second terminal’ is in the insulator.

65. In conclusion I find that claim 22 is novel over the cited documents.

Inventive Step

66. Section 3 of the Patents Act 1977 states:

> *An invention shall be taken to involve an inventive step if it is not obvious to a person skilled in the art, having regard to any matter which forms part of the state of the art by virtue only of section 2(2) above (and disregarding section 2(3) above).*

67. To determine whether or not an invention defined in a particular claim is inventive

over the prior art, I will rely on the principles established in *Pozzoli SPA v BDMO SA [2007] EWCA Civ 588*, in which the well known *Windsurfing* steps were reformulated:

> *(1)(a) Identify the notional "person skilled in the art";*
> *(1)(b) Identify the relevant common general knowledge of that person;*
>
> *(2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;*
>
> *(3) Identify what, if any, differences exist between the matter cited as forming part of the "state of the art" and the inventive concept of the claim or the claim as construed;*
>
> *(4) Viewed without any knowledge of the alleged invention as claimed, determine whether those differences constitute steps which would have been obvious to the person skilled in the art.*

68. The request argues that:

> *The skilled person is a design engineer or motor systems specialist working in the field of electric motor, especially three-phase electric motor, design, particularly familiar with stator segment assembly, electrical interconnects, and PCB integration. They possess practical experience with insulation displacement connectors (IDCs), press-fit technologies, and motor winding techniques.*

69. The request also argues that the common general knowledge (CGK) includes matter referenced from specific portions of the cited patent documents (in particular the parts of the patents that discuss related prior art) and from the mag-mate datasheet D5. The observer argues that the highlighted passages should not be taken to demonstrate CGK. The observer does not however specifically identify any concepts that they think would be outside of the CGK, nor do they comment on the definition of the skilled person that I highlight above.

70. I agree in general with the observer on this point. Published patents in are not usually considered to be part of the CGK. However, this does not mean I disagree with all of the conclusions of the requestor about CGK. I am sympathetic of where the highlighted passages refer to prior art concepts as being 'well known', eg the early parts of paragraph 4 of document D2. But I do not think discussion of specific prior art patents is helpful, such as references the requestor makes to paragraphs 2 and 3 of document D3.

71. I agree with the general idea presented by the requestor as to who the skilled person is; I think they are someone with knowledge of three phase motors in general and of electrical connectors in general.

72. My opinion is that the CGK would cover three phase motors and how stator windings can be segregated as individual coil windings that are subsequently connected to the motor driver circuitry. I agree with the requestor that laminated cores would be GCK for stator coils.

73. Also, I think that CGK would extend to general concepts of electrical connectors. I think that the existence of push-fit terminals for use with conductive holes in PCBs is CGK. I also think that the existence of insulation displacement terminals/connectors (IDC) as such would be part of CGK as they seem to be a common way to make fast connection to wires without using relatively complex means such as soldering processes or tightening screw fasteners etc..

74. However, I do not agree with the assertion from the requestor that combined connectors with an IDC terminal at one end and a push-fit PCB terminal at the other is CGK. It seems that, while such combined connectors are demonstrated in the specifically selected documents, their common and wide use has not been demonstrated to me. Also, I am also not persuaded by the assertion that IDCs are '*commonly used in motor applications'* .

75. I am also not persuaded that the use of PCBs in motor construction for stator wiring is CGK. The requestor points to paragraph 5 of D1, but that just states that '*it is known in the art to use a printed circuit board to interconnect the various winding coils of the stator'* which is short of saying such use is so well known that it is CGK. The requestor also points to the mag-mate document D5, but this merely discusses possible issues with soldering motor wires to a pcb that the product overcomes; I don't think this demonstrates pcbs are CGK for internal motor wiring.

76. I shall address the independent claims in order and then consider the dependant claims if necessary.

Claim 1 citing D1 combined with any of D2, D3, D4, D5 or D7

77. The observer makes no comment on the inventive concept that the request identifies. I am happy to accept the concept provided on page 22 of the request.

78. The request presents document D1 as the closest prior art and concludes that the difference between it and the inventive concept are that the following features of claim 1: a). That the IDC connectors each have a second terminal providing an elongate element; b). That the first and second terminals are integrally formed of a conductive material; c). That a circuit board has apertures for the second terminals and is connected to the coils of each of the segments.

79. The observations disagree with this analysis and argue that the requestor is finding more features in D1 than are actually disclosed. I will discuss D1 below and address the differences of opinion as to what is discloses.

D1 US 2005/212377 A1

D1 shows ways of connecting together segmented stator coils of a motor, where each stator comprises a discrete coil of wire around a segment assembly. Figure 5a below is an example of one such assembly comprising a central laminated stator potion 20, an insulating lead end cap 50 and a bottom end cap. A coil 92 is wrapped around the stack and the end caps.

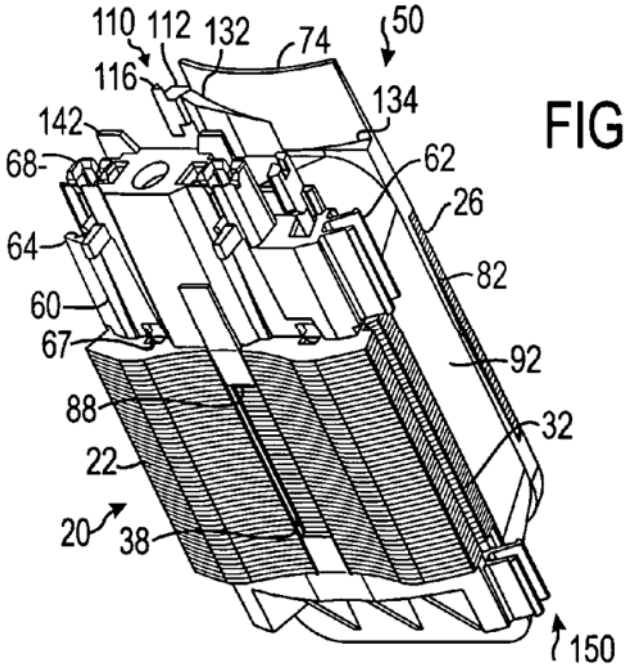
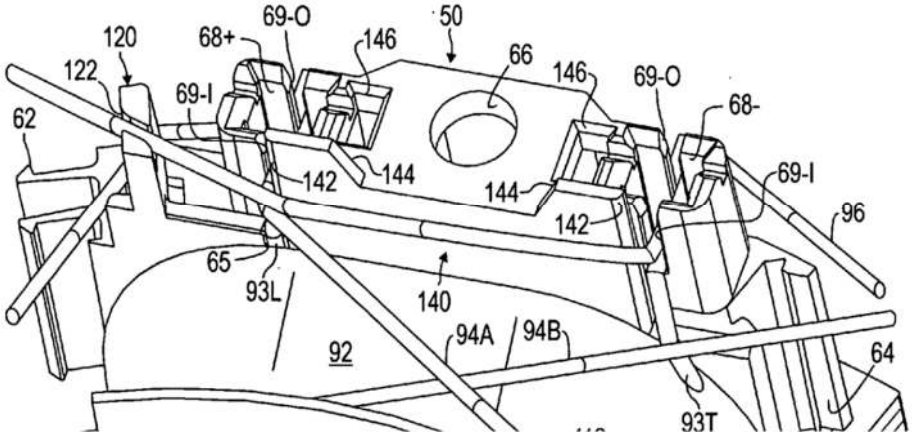


FIG. 5A

80. Detail of the lead end cap are shown in figure 4 below which better shows the coil wires 93L and 93T extending from coil 92 to what paragraphs 49 to 53 describe as IDC pockets 68+ and 68-. These pockets are said to have slits eg 69-O, 69-I with receive the wires of the coil. In addition, these IDC pockets also receive a second set of wires that interconnect various stator phases together, with the figure showing phase wires 94A and 96. I note that paragraph 53 states:

> *The alignment slots 146 facilitate automated assembly of the stator 10 by providing a reference point for aligning automated devices that embed IDCs (not shown) in the IDC pockets 68+, 68-. For example, the present embodiment preferably uses insulation displacement connectors (IDCs) manufactured by Tyco. The IDCs fit into the pockets 68+, 68-. Preferably, the IDC pockets 68+, 68- have upward posts within the pockets to facilitate positioning of the IDCs. Once installed, the IDCs electrically connect the winding coil wires (e.g., 92) and the interconnect wires (e.g., 94A and 96) passing through the pocket 68+, 68-.*



81. The request takes paragraph 5, which discusses the state of the art, as basis for the skilled reader of D1 to consider using a PCB for interconnecting coils, rather than what the detailed embodiments of D1 show, which is use of multiple wires between IDCs at each coil to form the interconnects. I note that paragraph 5 says:

> *Segmented stators require various manufacturing steps to interconnect all the individually wound coils on the segments to form the phase windings. To interconnect the winding coils of the stator, it is known in the art to use a printed circuit board to interconnect the various winding coils of the stator. The printed circuit board is generally circular and has a plurality of terminal pads that connect to terminal pins on each end cap of the stator.*

82. The observations argue that paragraphs 49 to 53 and the figures do not describe or show IDC connectors with two arms. The observations then state that in the prior art, it is well known to strip and solder wires to an IDC. I do not think that the skilled reader would understand D1 to suggest the various wires shown are soldered, instead I think it is implicit that the wires are mechanically inserted to the IDC to provide an electrical interconnection.

83. The request appears to argue that the skilled reader, given paragraph 5 would seek to modify the motor assembly of D1 to use a PCB instead of the shown wires, and that they would thus be motivated to seek methods of directly contacting the PCB to the coil wires. The request notes paragraph 113 of D1 which says:

> *After stitching the interconnect wires as described above, IDCs are positioned in the IDC pockets IDC+, IDC- and forced onto the wires positioned through the pockets IDC+, IDC-. As is known in the art, IDCs electrically connect the plurality of wires positioned in the IDC pocket and provide a terminal coupling for connecting to a terminal end of the wire leads for the phases. Preferably, insulation displacement connectors (IDCs) manufactured by Tyco are used with the disclosed stator assembly 10 and end caps 50. Excess portions of the interconnect wire as well as the posts 148 on the outboard side of the stator 10 are trimmed, and the stator 10 may be positioned in a shell.*

and argues that this would motivate the skilled reader to look for a connection solution of the TYCO company and seemingly this would lead them to document D5. The request concludes that a combination of D1 and D5 would '*inevitable result in the claimed invention'* . The request then goes on to say:

> *Additionally or alternatively, the author of D1 explicitly directs the skilled reader to use this type of connector. Since D5 is firmly within the purview of the common general knowledge of the skilled reader (of both The Patent and D1), there can be no inventive step associated with considering using this type of connector.*
>
> *Moreover, since D2, D3, D4 and D7 also show electrical connectors combining IDC with press-fit as presented in section 5, also any combination of D1 with one of these teachings would also lead the person skilled in the art towards the claimed apparatus of claim 1.*

84. I do not think that document D5 can be taken to be Common general knowledge.

85. The observations argue that a combination of D1 and D5 would not teach the use of IDCs that have two arms to pierce the wire, and thus a feature of claim 1 would be missing. In the observations in reply the requestor argues that this is clearly wrong as the IDC in D5 must pierce the wire.

86. I have difficulty understanding why the skilled reader of D1 would be motivated to make significant modifications to use a PCB instead of what is demonstrated, which is the interconnection of the phases by using wires between the IDC pockets of the stator segment coils. The requestor does little to convince me that paragraph 5 would cause the reader to embark on such modifications. The observer does little to rebut the proposed idea that the reader is motivated to make such modifications.

87. In the observations in reply, the requestor says:

> *In my view, D1 is a promising starting point, since it discloses a segmented motor stator and already indicates that the individual coils can be interconnected by a PCB. Hence, D1 does not expressly "forbid" the combination of a segmented stator with a PCB. Although D1 focuses on the interconnection of coils by additional wires, the person skilled in the art would recognise that this procedure is cumbersome and expensive. The skilled person would therefore be motivated to look for alternative interconnection techniques. In particular, the teaching of D5 would prompt the skilled person to avoid soldering and to employ PCB interconnection also for segmented stators. Since this type of connector is not new and is well known in the art (see, for example, D2 to D7), the mere application of such connectors to a slightly different kind of electric motor (a segmented stator motor) cannot support an inventive step.*

88. Having read D1 and considered the arguments of both sides, my conclusion is that there is insufficient evidence that the skilled reader would be motivated to replace the wire interconnects of D1 with a PCB arrangement and thus they would not embark on looking for IDC connectors suitable for connecting wires to PCBs. Thus I do not think the reader of D1 would be motivated to take notice of any of documents D2, D3, D4, D5 or D7. I think the requestors argument for a lack of inventive step fails on this point. Given this, I do not need to consider the rest of the arguments presented by the requestor and observer about how various combinations of documents might be made.

89. I find that claim 1 does have an inventive step over document D1 when read with any of the D2, D3, D4, D5 or D7 documents. I therefore do not need to consider the inventive step of dependant claims 2 to 11.

90. I note one final comment contained in section 7 of the request:

> *A connector of the D5 type is explicitly mentioned in D1. By incorporating the teaching of D5 into D1 "by reference", claim 1 arguably lacks novelty.*

I do not think that D5 can be considered in any way to be incorporated by reference. There is nothing in D1 that points to D5. The only thing in D1 is a reference to the

company Tyco as a manufacturer of IDCs that are suitable for the purpose of D1, which is for IDCs that connect multiple wires together. Document D1 does not direct the reader to find different types of IDC such as that in shown by D5.

Claim 12

91. The request states that:

> *Although claim 12 is presented as an independent claim, it essentially claims a straightforward method to arrive at an apparatus according to claim 1. The reasoning viz claim 1 applies to claim 12 mutatis mutandis.*

92. As I find the request fails to persuade me that claim 1 lacks an inventive step, I come to the same conclusion for claim 12.

93. I find claim 12 does have an inventive step. I therefore do not need to consider the inventive step of dependant claims 13 to 20.

Added matter

94. Section 76 of the Act states:

> *…*
> *(2) No amendment of an application for a patent shall be allowed under section 15A(6), 18(3) or 19(1) if it results in the application disclosing matter extending beyond that disclosed in the application as filed.*
> *...*

95. Guidance on section 76 has been provided in *Richardson-Vicks Inc's Patent*[3] where Jacob J (as he was then) noted:

> *"The test of added matter is whether a skilled man would, upon looking at the amended specification, learn anything about the invention which he could not learn from the unamended specification."*

and in *Bonzel Schneider*[4]*,* where Aldous J (as he was then) stated the approach as:

> *"The decision as to whether there was extension of disclosure must be made on a comparison of the two documents read through the eyes of a skilled addressee. The task of the court is threefold:*
>
> *(1) To ascertain through the eyes of the skilled addressee what is disclosed, both explicitly and implicitly in the application.*
> *(2) To do the same in respect of the patent as granted.*
> *(3) To compare the two disclosures and decide whether any subject matter relevant to the invention has been added whether by deletion or addition.*
>
> *The comparison is strict in the sense that subject matter will be added unless*

[3] Richardson-Vicks Inc.'s Patent [1995] RPC 568
[4] Bonzel and Schneider (Europe) AG v Intervention Ltd [1991] RPC 553

such matter is clearly and unambiguously disclosed in the application either explicitly or implicitly.

96. The request argues that both claims 11 and 22 comprise added matter.

Claim 11

97. The claim reads:

> *11. The stator of claim 1, wherein the first terminals of the plurality of connectors include prongs adapted to make incisions into and form an electrical connection with the electrical coils of the plurality of segments.*

98. The request notes that claim 1 requires the first terminal of a connector to have two arms, and dependant claim 11 then further requires the first terminals to have prongs. The request argues that there is no support in the original filing for first terminals to have both arms and prongs.

99. Looking at the original A1 publication (which reflects the original filing) I note paragraphs 29 to 31 that describe figure 3 which shows an example of a connector. The description refers to the wire insulation-displacement parts 214 and 216 of the first terminal as 'prongs', whilst the opposite PCB contacting part of the second terminal has compression parts 232, 234 referred to as 'flexible spring-like arms'. Nowhere in the original filing are parts of the first terminal of the connector referred to as arms.

100. Granted claim 11 was amended only by being renumbered from original claim 10, and refers to 'prongs'. Granted claim 1 was amended to add the feature of 'arms'. The function of the arms in claim 1 appears to be essentially the same as the function of the prongs of claim 11. In other words the arms and prongs both act as IDCs. Thus it seems to me that the applicant may have erroneously provided two different definitions for the same feature of the invention in the granted claim set.

101. In their observations, the proprietor merely state that original paragraphs 9 and 29 provide basis for claim 11. The requestor in their observations in reply notes that the proprietor has failed to show where in the original filings the feature of 'two arms' could be derived.

102. The first question for me to consider is if the skilled reader might come to the conclusion that there is an error in drafting the granted the claims and nothing new was meant. I do not think that the law allows such a consideration to be made. Instead I think that the skilled reader is expected take to the disclosures at face value.

103. I think the skilled reader is told in that the granted patent that claim 11 requires the first terminal to have 'two arms' and to have 'prongs'. It is clear that the original filed specification only has the first terminal as having prongs, with the embodiments only showing a single pair of such prongs.

104. Thus I conclude that claim 11 comprises added matter.

Claim 22

105. The claim reads:

> *22. The electrical connector of claim 21, wherein the second terminal is adapted to be inserted into an insulator, wherein the insulator comprises an aperture adapted to support the electrical wire.*

106. The request notes that the new claim 22 requires the second terminal of the conductor to be inserted into an aperture of an insulator, while paragraph 8 of the A1 publication states that it is the first terminal that is adapted to be inserted into an insulator, with a circuit board having apertures adapted to receive the second terminals. Thus it is argued that there is no support for claim 22 to have the second terminal used in this manner.

107. Looking at the original filing, paragraph 24, when referring to figure 1, states that upper insulators 110 capping each stator tooth have pockets 116, 118 that each can receive a connector terminal; Specifically a pocket receives the first terminal of a connector. I note that paragraph 25 goes on to describe apertures 132, 134 in the PCB 130 which receive the second terminal of a connector.

108. In their observations, the proprietor states that the newly added claim 21 is supported by the other original claim 1 and 12; They say that claim 21 *'… and relates to the same subject matter reformulated under a different claim category.'* The requestor in their observations in reply notes that this fails to address the question of if claim 22 is valid or not.

109. Again, it appears to me that there may have been a drafting error when the pre-grant amendments introduced claim 22. However, I do not think that this can be taken into account when considering added matter.

110. I find nothing in the original filed specification that suggest that the second terminal is inserted into an insulator.

111. Thus I conclude that claim 22 comprises added matter.

Conclusion

112. It is my opinion that claim independent 21 lacks novelty on the basis of the disclosure of any of documents D2, D3, D4 or D7.

113. It is my opinion that dependant claim 22 is novel in the light of the cited documents.

114. It is my opinion that independent claims 1 and 12 do have an inventive step over the combined disclosures of document D1 and any of documents D2, D3, D4, D5 or D7.

115. It is my opinion that claims 11 and 22 both comprise added matter.

116. Therefore the patent is invalid on the basis of lack of novelty and added matter.

Application for review

117. Under section 74B and rule 98, the proprietor may, within three months of the date of issue of this opinion, apply to the comptroller for a review of the opinion.

Gareth Lewis
Examiner

NOTE

This opinion is not based on the outcome of fully litigated proceedings. Rather, it is based on whatever material the persons requesting the opinion and filing observations have chosen to put before the Office.