Patents Act 1977 **Opinion Number** **02/17**

OPINION UNDER SECTION 74A

Patent	EP 2086102 B1
Proprietor(s)	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.
Exclusive Licensee	
Requester	Jenner & Block London LLP
Observer(s)	JA Kemp
Date Opinion issued	25 April 2017

The request

1. The Comptroller has been requested by Jenner & Block London LLP ("the requester") to issue an opinion as to whether patent EP 2086102 B1 ("the patent") is valid. The requester asks me to consider whether certain claims of the patent are novel in light of two prior art documents that are discussed in the request:

> "*The Design and Implementation of a Modified Single Phase Inverter Topology with Active Cancellation of Common Mode Voltage*", an MSc thesis by Mr Aakash V.K. Rao, submitted to the University of Wisconsin in Madison in 1998 ("RAO"); and
>
> Japanese patent application JPH 09-140157 (Sanyo Electric Co. – inventors Yasuhiro Makino and Masahiro Maekawa) published on 27 May 1997 ("MAKINO").

2. The request includes an English translation of the German-language description of the patent. This translation is the English-language description of the Proprietor's corresponding EP(DK) patent (publication no. DK/EP 2086102 T3). I have used this translation in order to help me interpret the description of the patent. An English translation of MAKINO was also included in the request and I have used this translation to interpret MAKINO.

Observations and observations in reply

3. Observations were received from JA Kemp ("the observer"). Subsequently, observations in reply were received from the requester.

4. Rule 96 of The Patents Rules 2007 (as amended) makes provisions for observations and observations in reply in respect of opinions. More specifically, rule 96(1) allows

observers to “file observations on any issue raised by the request”. Meanwhile, rule 96(4) requires that observations in reply must be “confined strictly to matters in reply”.

5. Having considered the requester’s observations in reply, I believe that they are not confined to the issues that were raised in the request and are, therefore, not confined strictly to matters in reply as required by rule 96(4). I note that the observations in reply contain arguments about the inventive step of claim 1, along with supporting exhibits 3a-3f. I believe these arguments and exhibits cannot relate to “matters in reply” as required by rule 96(4) because the request only relates to the question of the novelty of claims 1 and 9. I have, therefore, disregarded exhibits 3a-3f and the inventive-step arguments relating to them.

6. I further note that the observations in reply also include exhibits 1 & 2a-2c that contain additional documentary information as to the publication date of the prior art document RAO. Given that the publication date of RAO has been disputed by the observer, I believe it is appropriate for me to take this additional information into account. I have, therefore, considered exhibits 1 & 2a-2c in reaching this opinion.

7. I would also note that, following receipt of the observations and the observations in reply, the observer made yet further submissions via e-mail. Rule 96 does not allow for any further rounds of submission beyond observations and observations in reply. I have, therefore, disregarded the observer’s further submissions.

The patent

8. The patent is entitled “Inverter for converting an electric direct current into an alternating current or an alternating voltage” and was filed on 15 May 2003 with a declared priority date of 15 May 2002. The patent was granted with effect from 22 September 2010 and remains in force.

9. The patent relates to an inverter (or DC/AC converter) for transforming a direct current (DC) voltage to an alternating current (AC) voltage. Figure 1 of the patent, reproduced below, shows a schematic circuit design of an inverter according to the invention.

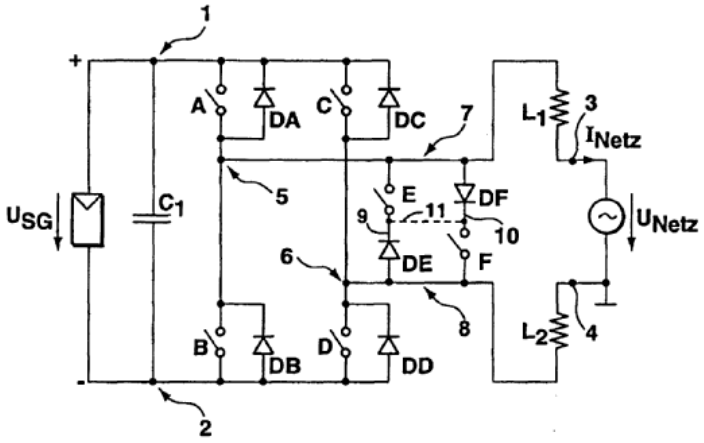


Fig. 1

10. As figure 1 shows, the inverter has two direct voltage terminals 1, 2 to which are connected a direct voltage source $U_{SG,}$ such as an external solar generator, and two alternating voltage terminals 3, 4 for connection to either a conventional 50Hz power network or an electrical load. The inverter also includes a buffer capacitor C_1 connected in parallel to a full bridge circuit having four switches A, B, C, D and rectifier (or "freewheeling") diodes DA, DB, DC and DD which are connected in antiparallel fashion. The output of the bridge is provided between the two parallel branches of the bridge circuit at connection nodes 5, 6 by connection lines 7, 8. Connection lines 7, 8 are respectively connected to alternating voltage terminals 3, 4 via choke inductivities L_1, L_2 respectively. According to paragraph [0044], the inventive difference over known topologies (such as those illustrated schematically in fig. 2 of the patent) is the provision of two additional electrical connection paths 9, 10 between the connection lines 7, 8. The additional electrical connection paths 9, 10 each include a switch E, F and a rectifier diode DE, DF, noting that the diodes DE, DF have opposing forward directions. Paragraph [0063] sets out an alternative embodiment where, instead of providing connection paths 9, 10 that include switches E, F and diodes DE, DF, a single connection path with a single high-frequency-switching switch may be provided.

The claims

11. Claims 1 and 9 are the only independent claims of the patent. They define an inverter and a method, respectively, as follows.

1. An inverter for feeding the energy originating from a solar generator to a grounded network, the inverter comprising:

two solar generator terminals (1, 2);

an energy buffer (C1) for buffering the energy originating from the solar generator;

a bridge circuit which is connected in parallel to the energy buffer (C1) and comprises at least two parallel branches which each comprise two switch units (A, B; C, D) connected in series, in parallel to each of which a rectifier diode (DA, DB, DC, DD) is connected; and

at least two alternating voltage terminals (3, 4) each of which is individually connected, via a connection line (7,8) in which one respective choke inductivity (L1, L2) is provided, to one of the parallel branches of the bridge circuit between two switch units (A, B; C, D) via a connection node (5, 6),

characterized in that

between the at least two connection lines (7, 8), a circuit arrangement (E, DE, F, DF, 9, 10, 11) is provided which may be controlled such that the circuit arrangement electrically connects the at least two connection lines (7, 8) in a first state and electrically separates the at least two connection lines (7, 8) in a second state.

9. A method for feeding the energy originating from a solar generator to a grounded network, the method comprising the steps of:

during at least a section of a half-wave of the alternating voltage of the network, connecting and separating a first terminal of an energy buffer (C1) to a first choke inductivity (L1) and a second terminal of the energy buffer (C1) to a second

choke inductivity (L2) in a clocked manner;

during at least a section of a next half-wave of the alternating voltage of the network, connecting and separating the first terminal of the energy buffer (C1) to the second choke inductivity (L2) and the second terminal of the energy buffer (C1) to the first choke inductivity (L1) in a clocked manner;

***characterized by**:*

separating the terminals of the energy buffer (C1) from the first choke inductivity (L1) and from the second choke inductivity (L2) when the first choke inductivity (L1) and the second choke inductivity (L2) are electrically connected to each other on their respective sides facing away from the network.

Novelty – the law

12. Section 1(1)(a) of the Act reads:

> *1(1) A patent may be granted only for an invention in respect of which the following conditions are satisfied, that is to say –*
> *(a) the invention is new;*

13. The relevant provisions in relation to novelty are found in section 2(1) and section 2(2) which read:

> *2(1) An invention shall be taken to be new if it does not form part of the state of the art.*
>
> *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.*

Claim construction

14. Before considering the documents put forward in the request I will need to construe the claims of the patent following the leading authority on claim construction, *Kirin-Amgen and others v Hoechst Marion Roussel Limited and others* [2005] RPC 9. This requires that I put a purposive construction on the claims, interpret them in the light of the description and drawings as instructed by Section 125(1) and take account of the Protocol to Article 69 of the EPC. Simply put, I must decide what a person skilled in the art would have understood the patentee to have used the language of the claim to mean.

15. I consider that the relevant skilled person is an electrical engineer with knowledge of inverters for converting direct current voltages to alternating current voltages.

16. I believe that claims 1 and 9 are generally straightforward to construe. However, there are a number of specific points of construction that I must deal with.

17. The first line of claim 1 defines, “An inverter for feeding the energy originating from a

solar generator to a grounded network". In their observations in reply, the requester argues that this definition does not require that a solar generator is connected to the inverter. They also point out that in a claim that commences with, "Apparatus for", the word "for" should normally be interpreted as *suitable for*. The requester also points to paragraphs [0001] and [0064] to [0066] of the patent which, in addition to solar generators, refer to fuel cells and batteries as sources of DC power for inverters. I agree with the requester. The skilled person would understand that claim 1 is directed to an inverter that is *suitable for* feeding the energy originating from a solar generator to a grounded network. In other words, the skilled person would understand that the patentee is claiming protection for an inverter and not a combination of an inverter and a solar generator or, for that matter, a combination of an inverter and a grounded network.

18. The requester also argues that the "solar generator terminals" of claim 1 should be interpreted as ordinary terminals or connection points into which a direct current may be fed. In support of this argument the requester has directed me to paragraph [0011] of the patent that describes the terminals 1, 2 illustrated in figure 2 as direct current terminals. I agree with the requester. I note that figures 1 and 2 simply illustrate the terminals 1, 2 as ordinary connection points to which the solar generator U_{SG} is connected. I also note that paragraphs [0011] and [0044] describe the terminals 1, 2 as direct current terminals. Therefore, in light of the description and drawings, I consider that the skilled person would understand that the "solar generator terminals" of claim 1 are terminals that are suitable for connection to a solar generator.

19. I also agree with the requester that claim 1 does not contain any limitation as to the electrical capacitance of the "energy buffer". I consider that the "energy buffer (C1) for buffering the energy originating from the solar generator" specified in claim 1 would be understood by the skilled person as an energy buffer *suitable for* buffering energy originating from a solar generator.

Novelty – the arguments

20. The request asks me to consider whether claims 1 and 9 are novel in light of RAO and whether claim 1 only is novel over MAKINO. I shall start by considering RAO.

RAO

21. The parties dispute whether RAO was made available to the public before the priority date of the patent, as required by section 2(2). I must therefore consider this question before I can go on to consider whether RAO shows claims 1 and 9 lack novelty.

22. Following the approach of previous UK case law, such as the decision of the Patents County Court in *Kavanagh Balloons Pty Ltd v Cameron Balloons Ltd* [2004] RPC 5, I believe that the correct standard of proof required to assess the publication dates of non-patent disclosures, such as RAO, is *the balance of probabilities*. It follows that proof beyond reasonable doubt of the publication date of such documents is not required. I must therefore consider the parties' submissions and reach an opinion as

to the publication date of RAO on the balance of probabilities.

23. In the request, the requester says that RAO was made available to the public in May 1999, well before the priority date of the patent. In support, the requester cites an excerpt from an (unidentified) item of correspondence from a Mr Cohen who is said to serve as the Assistant Director of Cataloguing and Metadata Services at the Memorial Library of the University of Wisconsin in Madison ("UW"). In the excerpt cited, Mr Cohen states that RAO

> *was physically present and open to copying, inspection, and review after it was catalogued on May 13, 1999 and subsequently placed on the designated stack in the UW library system. Beginning in 1999, the Rao reference would have been, and continues to be, fully accessible and available for review – without limitation or restriction – by not only UW faculty and students, but also the general public as well since the UW library is fully accessible and open to the public.*

24. The observer submits that RAO cannot be considered as pre-published prior art and that I should not consider it to assess the novelty of claims 1 and 9. The observer says that is it not possible to derive from Mr Cohen's statement whether RAO was actually made available to the public at all, and in which way and at what time. They say that Mr Cohen's statement only *assumes* that, if everything happened in its normal way, RAO would have been part of the library at UW. Thus, the observer says, it is still questionable that RAO was actually available to the public prior to the priority date of the patent. That is, from the information provided in the request, it is not possible to tell when and how RAO was made available to the public and whether this was prior to the priority date of the patent.

25. Based on the statement of Mr Cohen provided in the request, and that RAO is an MSc thesis submitted to the University of Wisconsin in Madison, I am satisfied that on the balance of probabilities RAO was made available to the public in May 1999. Therefore, in my opinion, RAO was made available to the public before the priority date of the patent and forms part of the state of the art under section 2(2) for the purposes of novelty.

26. As I mentioned earlier, the requester submits further exhibits 1-2c in their observations in reply. Exhibit 1 is a letter from Mr Cohen that contains the statement cited in the request. Among other things, Exhibit 1 also states that, "the Rao reference was specifically catalogued in the UW library system on May 13, 1999 and then physically placed on the stacks and shelves of the UW Library in Madison, Wisconsin." Exhibit 2a is an article published in 1999 that includes a specific reference to RAO (reference 15 on page 95). Exhibit 2b is another article, also published in 1999, that also includes a reference to RAO (reference 11 on page 5). Similarly, Exhibit 2c is an MSc thesis bearing a date of 10 August 2001 that also includes references to RAO (on pages 17 and 95). Taking these exhibits at face value, I think they only serve to reinforce my opinion that RAO was made available to the public before the priority date of the patent.

27. I turn now to the question of whether RAO shows that claims 1 and 9 lack novelty. I shall begin by considering claim 1.

Claim 1

28. The requester argues that all of the features of claim 1 are disclosed by RAO. The observer disagrees and submits the features of lines 1-3 and 10-13 of claim 1 are not taught by RAO. I shall begin by considering the features of lines 1-3. Adopting the numbering of the features given in the request, it is common ground between the parties that the relevant features are:

    1 *An inverter for feeding the energy originating from a solar generator to a grounded network*

    1.1 *the inverter comprises two solar generator terminals;*

    1.2 *the inverter comprises an energy buffer for buffering the energy originating from the solar generator.*

29. Feature 1, as I have construed it in paragraph 17 above, requires an inverter that is *suitable for* feeding the energy originating from a solar generator to a grounded network. The requester argues that feature 1 is disclosed, for example, by figure 3.3 on page 45 of RAO (reproduced below). Their argument is that the inverter shown in figure 3.3 would be suitable for feeding the energy originating from a solar generator to a grounded network. They argue that the skilled person would know that the energy output from a solar generator does not differ from any other DC source in a manner to require any special adaption of the inverter itself. Hence, the requester says that any inverter, including the inverter of RAO, is in principle suitable for feeding the energy originating from a solar generator to a grounded network. The observer disagrees, arguing that, on the contrary, RAO does not disclose in any part that the described topology would somehow be suitable to feed energy provided by a solar generator into a grounded network, namely a public electrical grid. The observer argues that RAO does not disclose a solar generator as an energy source or a grounded public electrical grid as an energy sink. Thus, the observer argues that feature 1 is not taught by RAO.

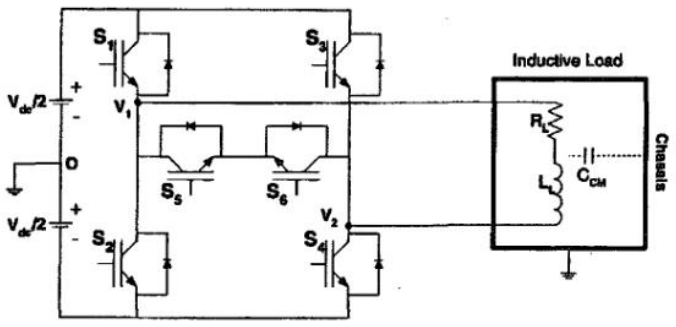


Figure 3.3: Schematic Diagram of the Proposed Single Phase Inverter Driving a Passive Load

30. I agree with the requester that feature 1 is disclosed by RAO. Although RAO does not state that the inverter of figure 3.3 is to be used for feeding the energy originating from a solar generator to a grounded network, I consider that the skilled person would nevertheless understand that the inverter of figure 3.3 is suitable for that purpose. For example, while the inverter of figure 3.3 is shown in combination with

two DC power sources, I consider that the skilled person would understand that the inverter could be used with a solar generator without any modification. Thus, in my opinion, feature 1 is disclosed by RAO. I would add that, in my opinion, figure B.1 of RAO (illustrated below and discussed further at paragraph 32) also discloses feature 1 for the same reasons.

31. According to the construction of feature 1.1 that I set out in paragraph 18 above, feature 1.1 would be understood as requiring that the inverter includes two terminals that are *suitable for* connection to a solar generator. The requester says that, because figure 3.3 and figure 3.1 (which is similar to figure 3.3) each disclose two DC voltage sources connected in series, RAO discloses the two required terminals. On the other hand, the observer argues that, "the input of the inverter in figures 3.1 and 3.3 is coupled to a series connection of batteries grounded at the centre tap, i.e. there is no connection to any solar generator. Thus there can be no solar generator terminals as required by feature 1.1." Whilst I have accepted the requester's construction of feature 1.1, I am not persuaded that there is any explicit disclosure of two direct current terminals, suitable for connection to a solar generator shown in figures 3.1 and 3.3. However, I believe the skilled person would understand from these figures that two ordinary direct-current terminals would necessarily be required to connect the batteries to the inverter. Therefore, I believe that two direct-current terminals (i.e. two terminals suitable for connection to a solar generator) are implied by figures 3.1 and 3.3. Thus, in my opinion, feature 1.1 is disclosed by RAO. I would also add that, in my opinion, figure B.1 of RAO also discloses feature 1.1 for the same reasons.

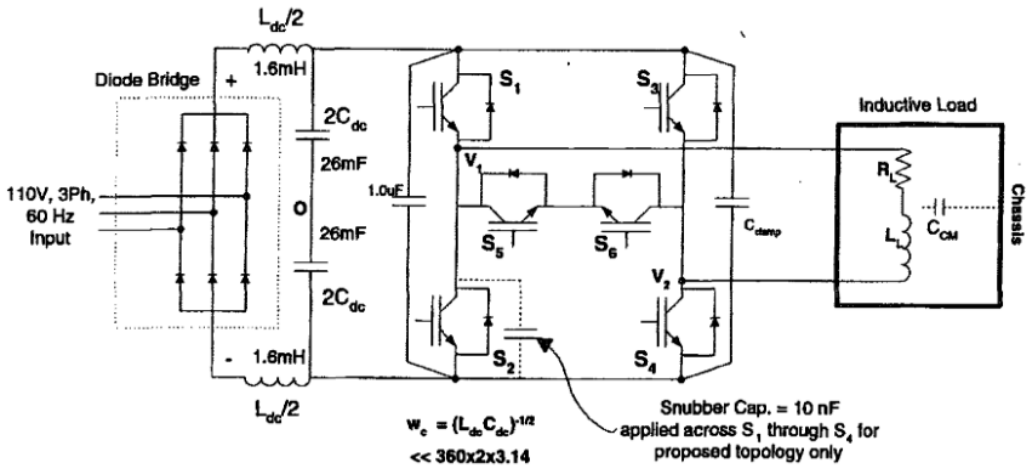


Figure B.1: Schematic Power Circuit Diagram for Laboratory Prototype Inverter

32. Turning now to feature 1.2. As I have construed it at paragraph 19 above, feature 1.2 requires that the inverter comprises an energy buffer suitable for buffering energy originating from a solar generator, noting that feature 1.2 does not specify any limitation as to electrical capacitance of the energy buffer. The requester argues that feature 1.2 is disclosed by figure B.1 shown in Appendix B (reproduced above). They say figure B.1 shows an energy buffer connected in parallel to the left-hand branch of the bridge circuit, i.e. the 1.0 µF capacitor shown in figure B.1. Alternatively, the requester argues that the two capacitances of 26 mF connected in series to each other (and also connected in parallel to the left-hand branch of the bridge circuit)

would also function as an energy buffer. The requester says that the suitability of any capacitor for buffering energy is independent from its electrical capacitance, i.e. a capacitor with a lower electrical capacitance cannot buffer as much energy as a capacitor with a higher electrical capacitance. The requester therefore says that, regardless of their electrical capacitance, the skilled person would understand that either the 1.0 µF capacitor or the 26 mF capacitors would still nonetheless function as an energy buffer as required by feature 1.2.

33. The observer disagrees. The observer says that the 1.0 µF capacitor of figure B.1 would be understood by the skilled person as a "clamp" capacitor that is used for damping high-frequency voltage peaks when switching the bridge's transistors. The observer goes on to argue that the skilled person would know that single phase solar inverters having a rated power in the kW range would require an energy buffer with a capacitance of several thousand µF for voltages in the 400-900 V range. As a result, the observer says that the 1.0 µF capacitor shown in figure B.1 is not suitable for the purpose defined in claim 1, i.e. it is not suitable for buffering energy originating from a solar generator.

34. I agree with the requester and I accept the requester's argument that, in use, the 1.0 µF capacitor would at least store some of the energy input into the inverter and would, therefore, function as an energy buffer within the meaning of feature 1.2. Similarly, I accept the requester's alternative argument that the two serially-connected 26 mF capacitors would also function as an energy buffer within the meaning of feature 1.2. Thus, in my opinion, feature 1.2 is disclosed by RAO.

35. I shall now move on to consider whether RAO discloses the features of lines 10-13 of claim 1. Using the numbering of the features given in the request, it is common ground that the relevant features are:

> 1.4 *the inverter comprises at least two alternating voltage terminals,*
>
> 1.4.1 *each of the alternating voltage terminals is individually connected, via a connection line to one of the parallel branches of the bridge circuit between two switch units via a connection node,*
>
> 1.4.1.1 *in each of the connection lines one respective choke inductivity is provided.*

36. The requester's main argument in respect of features 1.4, 1.4.1 and 1.4.1.1 rests on *combining* the schematic diagram of the inverter illustrated in figure B.1 of RAO (shown above) with the schematic diagram of a typical EMI filter topology illustrated in Figure 2.10 of RAO on page 26 (reproduced below).

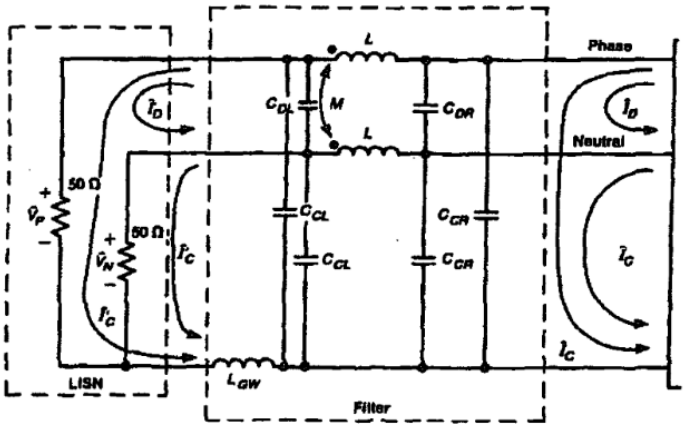


Figure 2.10: Schematic Diagram of a Typical EMI Filter Topology

37. Feature 1.4 specifies that the inverter includes at least two alternating voltage terminals. The requester submits that the two black circles located next to inductive loads “L” in figure 2.10 are alternating voltage terminals. The observer disagrees, saying that the skilled person would understand that these dots indicate the start of the windings of the two coupled coils of a common mode choke. I agree with the observer in respect of figure 2.10. In my opinion, figure 2.10 does not disclose an inverter having two alternating voltage terminals. In respect of figure B.1, I would also add that figure B.1 does not explicitly disclose two alternating voltage terminals. However, I consider that the skilled person would understand from figure B.1 that two alternating voltage terminals would necessarily be required in order to connect the inductive load to the inverter shown in figure B.1. Hence, in my opinion, feature 1.4 is implicitly disclosed by figure B.1 of RAO.

38. Feature 1.4.1 requires that the two alternating voltage terminals are each individually connected, via a connection line, to one of the parallel branches of the bridge circuit between two switch units via a connection node. I believe that it is common ground between the parties that figure B.1 discloses two output lines, each extending from the connection nodes shown next to labels “V1” and “V2” respectively, to connect the output of the inverter to the “Inductive Load” shown on the right-hand side of the figure. Thus, given that two alternating voltage terminals are implied by figure B.1, it follows that, in my opinion, feature 1.4.1 is also disclosed by RAO.

39. Turning now to feature 1.4.1.1. Feature 1.4.1.1 requires that each connection line includes a choke inductivity. I believe it is common ground between the parties that the inverter of figure B.1 of RAO *does not* disclose feature 1.4.1.1, i.e. that figure B.1 *does not* disclose choke inductivities on the output side of the inverter. I agree with the parties on this point. The connection lines shown in figure B.1, extending from the connection nodes shown next to labels “V1” and “V2” respectively, *do not* each include a choke inductivity.

40. However, the requester submits that, according to pages 23-27, the filter disclosed in figure 2.10 of RAO can be arranged between a bridge circuit and an inductive load. They say that if one were to combine the circuit arrangements of the two figures then it would result in the combined topology illustrated in figure 17 of the request, reproduced below.

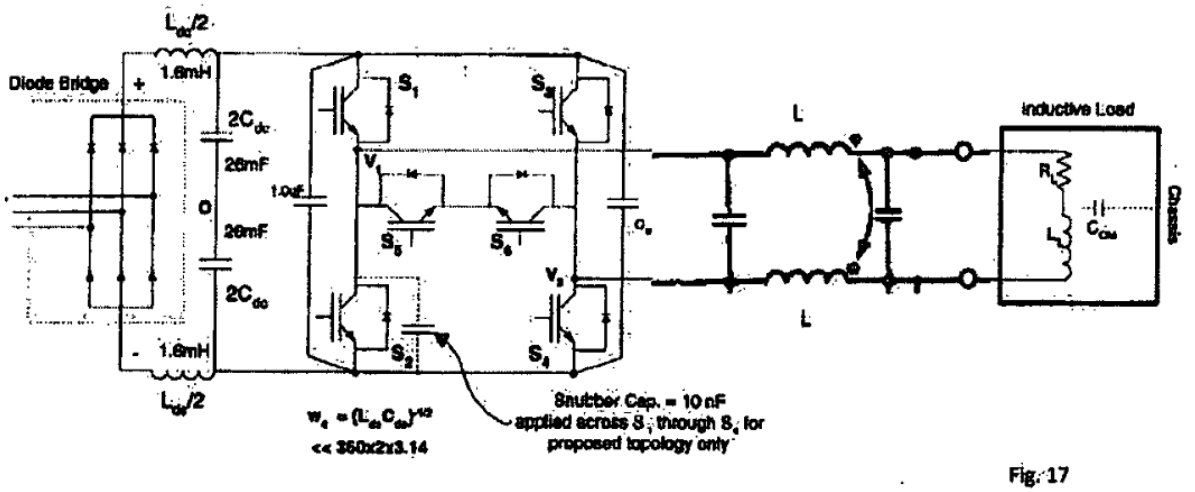


Fig. 17

41. The requester points to several parts of RAO in support of their argument for their combination of figures B.1 and 2.10. Firstly, the requester notes that page 105 of RAO states that:

> *The EMI mode filter used to attenuate conducted emissions, therefore, can be designed only to affect frequencies of 1 MHz and above for the proposed technology. […] The EMI filter used in conjunction with this topology must therefore be designed to attenuate lower frequency conducted emission. From this argument it follows that cost, size weight of the EMI filter would be appreciably larger for the conventional topology.* (Requester's emphasis.)

Secondly, the requester draws attention to page 107 of RAO:

> *Therefore, roughly speaking, the size of the EMI filter is governed by the extent of the common mode emissions produced by the inverter. Hence, the attenuation profile provided by the proposed topology directly translates into a smaller EMI filter.* (Requester's emphasis.)

Thirdly, the requester notes that page 109 of RAO states:

> *The above discussion shows that the proposed technology results in a significant attenuation of common mode voltage (up to 27 dBV) without otherwise altering the performance of the inverter. This attenuation translates directly into a significant reduction in the size, cost, and weight of the EMI filter needed to meet conducted emissions specifications.* (Requester's emphasis.)

42. On the other hand, the core of observer's argument in respect of feature 1.4.1.1 is that figure 17 of the requester's submissions is not at all shown in RAO. They further argue that figure 17 is not even derivable from RAO, especially not using figures 2.10 and B.1 as the requester suggests. As a consequence, the observer's position is that feature 1.4.1.1 cannot be taught by RAO.

43. I have to say that I agree entirely with the observer. The law of novelty requires that in order to anticipate a patentee's claim a prior publication must contain clear and unmistakable directions to do what a patentee claims to have invented. The

passages on pages 23-27, 105, 107 and 109 relied upon by the requester do not in my opinion contain clear and unmistakable directions that the topologies of figures B.1 and 2.10 should be in any way combined. For example, while these passages mention that EMI filters can be used with inverters, I have been unable to identify any passage that directs the skilled person, in a clear and unmistakable fashion, to combine the inverter of figure B.1 with the filter of figure 2.10. Moreover, in my opinion, these passages do not clearly and unambiguously disclose the combined topology that the requester has illustrated in figure 17 of their request.

44. The requester has drawn my attention to numerous other passages of RAO that they also rely upon to show that feature 1.4.1.1 is disclosed. For example, the requester points to section 3 (starting on page 30) that discusses various common mode voltage issues created from bipolar switching and unipolar switching. The requester says that these issues are similar to the problems addressed by the patent. Hence, they say, “the problems faced by the EP 102 patent and the Rao reference as well as the solution are identical to the disclosure of Rao”. In particular, the requester highlights pages 43, 45 and 46 of RAO that they say discuss the “freewheeling” or zero state through switches S5 and/or S6. In addition, the requester points to figure 2.9 on page 21 (reproduced below) that they say shows that inductances in the output lines are common components of inverter topologies. The requester then concludes that, “Hence, a person skilled in the art understands inductors are present at the AC output when considering the disclosed bipolar/unipolar switching problems since otherwise, without inductors, there cannot be a freewheeling state.” Whilst I accept that RAO mentions a freewheeling state and that inductances in the output lines are common components of inverter topologies, none of the passages or figures relied upon by the requester are sufficient, in my opinion, to provide clear and unmistakable directions to include chokes on the output lines of figure B.1, as required by feature 1.4.1.1.

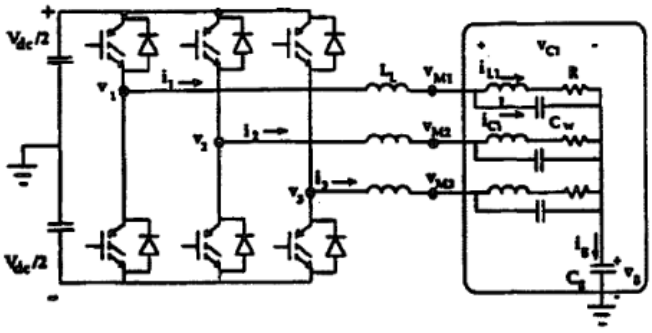


Figure 2.9: Illustration of Common Mode EMI Generation in a Typical Three Phase PWM Drive System

45. The requester also points to figure 4.7 on page 70 of RAO (reproduced below) and notes the presence of two inductances (of 0.4 mH) in the two serially-connected lines between the parallel branches of the bridge circuit. They say that, “this figure clearly verifies that inductances are present in the output lines of the inverter”. Whilst I accept that two inductances are shown in this figure, in my opinion, this does not amount to a clear and unmistakable direction to include a choke inductivity in each of the output lines of figure B.1, as required by feature 1.4.1.1.

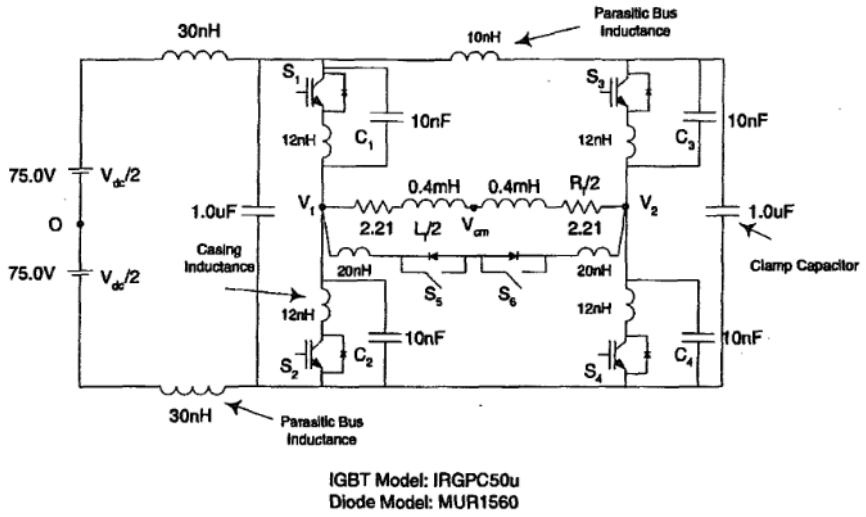


Figure 4.7: Simulation Model of Laboratory Prototype Inverter with Proposed Topology

46. Additionally, the requester points out that RAO refers on multiple occasions to an inductive load connected to the output of the inverter, as for example discussed in section 5.1, second paragraph (on page 78). That an inductive load is disclosed by RAO does not in my opinion amount to a clear and unmistakable direction to include a choke inductivity in each of the output lines of figure B.1, as required by feature 1.4.1.1.

47. I conclude that features 1, 1.1, 1.2, 1.4 and 1.4.1 are disclosed by RAO but that feature 1.4.1.1 is not disclosed by RAO. Thus, in my opinion, claim 1 is novel over RAO.

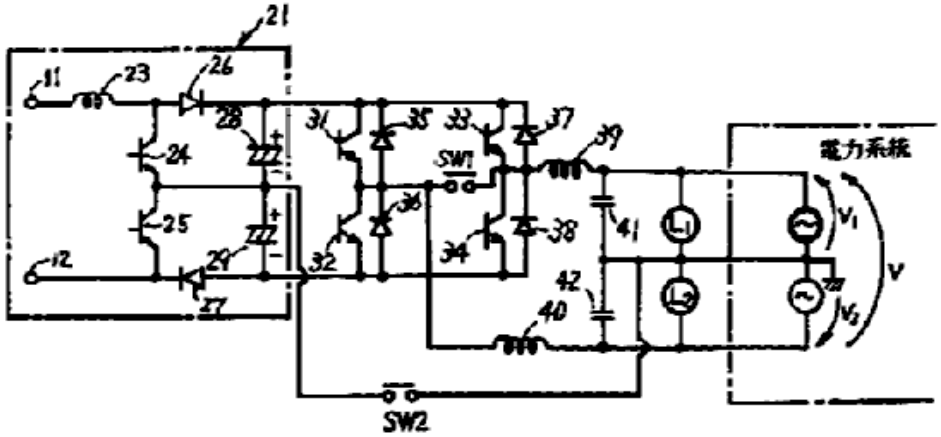
Claim 9

48. Having reached the opinion that claim 1 is novel over RAO, I believe that claim 9 can now be dealt with quickly because claim 9 must be novel for essentially the same reasons. Each of the steps of the method of claim 9 require that the terminals of an energy buffer are connected and disconnected to first and second choke inductivities in a particular manner. As I have discussed above, I consider that RAO fails to disclose that two choke inductivities are provided at the output of the inverter of figure B.1. It follows that figure B.1 cannot disclose the method steps of claim 9 since they involve connecting and disconnecting the first and second choke inductivities from the terminals of an energy buffer. I therefore accept the observer's argument that claim 9 is novel over RAO. I would add that the requester refers to several parts of RAO to argue that claim 9 lacks novelty, including figure 3.1 and pages 30-31, 34 and 48. In my opinion, none of these parts of RAO discloses the first and second choke inductivities required by the method steps of claim 9. Thus, in my opinion, claim 9 is novel over RAO.

MAKINO

49. I now move on to consider whether claim 1 is novel over MAKINO. I note that the

request only asks me to consider claim 1 so I have confined myself to claim 1 accordingly. The requester argues that the inverter described in respect of figure 1 of MAKINO (reproduced below) demonstrates that claim 1 lacks novelty.



50. From their various submissions regarding MAKINO, I believe it is common ground between the parties that MAKINO discloses the preamble (i.e. the pre-characterising portion) of claim 1. It is therefore only necessary for me to consider whether MAKINO discloses the characterising part of claim 1. Following the numbering given in the request, the features of the characterising part of claim 1 are:

    1.4.1.2 *between the at least two connection lines a circuit arrangement is provided,*

    1.5 *the circuit arrangement may be controlled*

    1.5.1 *such that the circuit arrangement electrically connects the at least two connection lines in a first state, and*

    1.5.2 *electrically separates the at least two connection lines in a second state.*

51. The requester argues that all of these features are disclosed by MAKINO. For example, they say that feature 1.4.1.2 is disclosed because switch SW1 shown in figure 1 of MAKINO is a circuit arrangement that is provided between two connection lines, namely the connection lines including the respective choke inductivities 39, 40. The requester says (and the observer agrees) that MAKINO discloses that switch SW1 can be controlled, thereby disclosing feature 1.5. The requester further says that paragraphs [0022] and [0023] of MAKINO teach that the switch SW1 may be closed to achieve the so-called “stand alone mode” of MAKINO and that this discloses the first state required by feature 1.5.1. The requester then says that paragraphs [0018] and [0019] of MAKINO teach that the switch SW1 may be opened (producing the “connected mode” of MAKINO) and that this discloses the second state required by feature 1.5.2. Thus, the requester argues that MAKINO shows that claim 1 lacks novelty.

52. The observer argues that MAKINO does not disclose the characterising part of claim 1. Their argument is subtle, and it rests on interpreting features 1.4.1.2 – 1.5.2 in light of feature 1 (set out at paragraph 28 above). The observer argues that MAKINO

only functions as an inverter for feeding energy from a solar generator into a grounded network (as required by feature 1) if switches SW1 and SW2 are in the open state, i.e. when the inverter of MAKINO is in its “connected mode”. In contrast, when switches SW1 and SW2 are closed (i.e. when the inverter of MAKINO is in the “stand alone mode”) the observer says that no feeding of energy into the network occurs. Thus, in the stand alone mode, the observer says the inverter of MAKINO is *not* suitable for feeding energy from a solar generator into a grounded network (since no feeding of energy to the network occurs in this mode). In other words, the observer is arguing that I should *only* consider the inverter of MAKINO as being an inverter suitable for feeding energy from a solar generator into a grounded network *when* it is functioning in the “connected mode” (i.e. when switch SW1 is closed). The observer says that *when* MAKINO occupies the “connected mode” it *cannot* be further controlled in a way that would produce the first and second states defined by features 1.5.1 and 1.5.2.

53. The requester responds by saying that claim 1 should be evaluated based on the actual features of the claim. They say that, because the observer has admitted that the preamble of the claim – and therefore feature 1 – is disclosed by MAKINO, it is not open to the observer to argue that the combination of feature 1 with features 1.5.1 and 1.5.2 is not disclosed by MAKINO. The requester says that features 1.5.1 and 1.5.2 simply define that the circuit arrangement can be controlled to provide the two states, i.e. the electrical connection of the connection lines in the first state and the electrical separation of the connection lines in the second state. They say that the nature of the two states defined by claim 1 is simply not specified any further by claim 1. I agree with the requester. Claim 1 must stand or fall based on the technical features defined by the claim. Having accepted that feature 1 is disclosed by MAKINO on one hand, I do not believe it is open to the observer to argue that it is not disclosed on the other. I therefore agree with the requester that switch SW1 corresponds to the “circuit arrangement” of feature 1.4.1.2 and that MAKINO discloses the switch SW1 is controllable to provide the first and second states required by features 1.5, 1.5.1 and 1.5.2. Thus, in my opinion, claim 1 lacks novelty over MAKINO.

Opinion

54. It is my opinion that claims 1 and 9 are novel over RAO.

55. It is my opinion that claim 1 lacks novelty over MAKINO.

Application for review

56. 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.

Stephen Richardson
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.