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Aktenzeichen / Case Number / N° du recours : T 32/82

Anmeldenummer / Filing No / N° de la demande : 79 300048.0

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Bezeichnung der Erfindung: Control circuit for energizing an electrically
Title of invention: ignited load
Titre de l'invention :

ENTSCHEIDUNG / DECISION

vom / of / du 14 March 1984

Anmelder/Patentinhaber:
Applicant/Proprietor of the patent: I C I
Demandeur/Titulaire du brevet :

Stichwort / Headword / Référence :

EPÜ/EPC/CBE Article 52(1),56

"Inventive Step - Implicit disclosure in prior art"

"Practice of the Boards of Appeal"

Leitsatz / Headnote / Sommaire

It follows from Art.113(2) EPC that, when deciding the appeal a Board of Appeal has no authority to order the grant of a European Patent containing claims which are different from those submitted by the applicant in their content or interdependency.

Europäisches
Patentamt

Beschwerdekammern

European Patent
Office

Boards of Appeal

Office européen
des brevets

Chambres de recours



Case Number: T 32 / 82

DECISION

of the Technical Board of Appeal 3.5.1

of 14 March 1984

Appellant:

Imperial Chemical Industries PLC
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Representative:

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Decision under appeal:

Decision of Examining Division 077 of the European Patent
Office dated 18 September 1981 refusing European patent
application No 79 300048.0 pursuant to Article 97(1)
EPC

Composition of the Board:

Chairman: G. Korsakoff
Member: J. van Voorthuizen
Member: P. Ford

Summary of Facts and Submissions

- I. European Patent Application No..79 300 048.0 filed on 11.01.79 (Publication No. 0 003 396) claiming a priority of 01.02.78 (GB), was refused by a decision of the Examining Division 077 of the European Patent Office of 18.09.81. That decision was based on claims 1-12 filed on 05.05.81.
- II. The reason given for the refusal was that the characterising part of claim 1 was not disclosed in the application as filed.
- III. The applicant lodged a notice of appeal, accompanied by a Statement of Grounds, against this decision on 31.10.81. The appeal fee was paid on the same date.
- IV. In a communication of 8.11.82 the Rapporteur of the Board of Appeal notified the applicant that he shared the opinion of the Examining Division and that furthermore the basic feature of the subject matter of the application (viz. the use of a transformer with substantial leakage) appeared to be obvious having regard to US-A-3 185 093.
- V. In his replies to this and further communications of the Board of Appeal the applicant argued essentially that it would not be obvious to a person skilled in the art that the US Patent in question discloses the possibility of using transformers having leakage to suppress undesired high frequencies. He would attribute the curves of certain graphs shown in this document to other causes than leakage inductance, such as core- and skin-effect los-

ses. In any case he would certainly not be directed to use a transformer with a deliberately introduced amount of leakage.

With his letter of 06.06.83 the applicant filed an amended claim 1 and requested that a European patent be granted on the basis of this claim and claims 2-12 as filed on 05.05.81.

These claims read as follows:

1. An electric ignition assembly comprising an electric ignition element and a control circuit for selectively energising the ignition element (40) only in response to input electrical energy from an a.c. source having predetermined electrical parameters, said control circuit comprising: first and second inductors (L_1 , L_2) having a common portion (M) constituting a mutual inductance linkage between said inductors said first inductor being adapted for connection to said a.c. source and said second conductor being connected to said ignition element (40), characterised in that at least one of the said inductors (L_1, L_2) has a non-linked inductance portion such that the coupling coefficient is less than 0.9 thereby providing protective leakage inductance in series with the electric ignition element.

2. An electric ignition assembly as claimed in Claim 1 characterised in that said first and second inductors (L_1, L_2) comprise primary (54,140) and secondary windings (52,150,230) of a transformer including a magnetically permeable structure (110,210,310), said primary winding being adapted for connection to a source of electrical energy (60), and said secondary winding being

connected to said ignition element (40), both said windings being magnetically coupled to said magnetically permeable structure.

3. An electric ignition assembly as claimed in Claim 1 or Claim 2 characterised in that said control circuit comprises an energy dissipation means (80,110,210,310) effectively coupled to at least one of said first and second inductors for dissipating input electrical energy as a function of the voltage across and/or current through at least one of said first and second inductors.

4. An electric ignition assembly as claimed in Claim 3 characterised in that said first and second inductors and said energy dissipation means are constructed as a transformer (50) having a magnetically permeable structure (110,210,310) providing a magnetic circuit for both mutual magnetic coupling between said first and second inductors and substantial self-linking flux through at least one of said inductors thereby increasing the leakage inductance of the transformer, said magnetically permeable structure also dissipating energy due to the passage of magnetic flux therethrough which energy dissipation increases as the structure becomes saturated with magnetic flux.

5. An electric ignition assembly as claimed in any one of Claims 2 to 4 inclusive characterised in that said magnetically permeable structure (110,210,310) comprises at least three sections (210,220,320,360) with said first and second inductors comprising corresponding first (140) and second (230) windings encompassing only two of said three sections.

6. An electric ignition assembly as claimed in any one of Claims 1 to 5 inclusive characterised in that said second inductor comprises electrically conductive wires (190,200) and a separate magnetic circuit (180) self-linking at least a portion of said wires.

7. An electric ignition assembly as claimed in any one of Claims 1 to 6 inclusive characterised in that said first inductor comprises a first magnetic circuit (210,240) which, at least in part, magnetically saturates when a predetermined excessive level of electrical current flows in said first inductor, and said second inductor comprises a second magnetic circuit (210,220) which does not magnetically saturate when said predetermined level of electrical current flows in said first inductor.

8. An electric ignition assembly as claimed in any one of Claims 2 to 7 inclusive characterised in that the magnetically permeable structure (110,210,310) comprises a ferrite material having apertures through which electrically conductive wires pass.

9. An electric ignition assembly as claimed in any one of Claims 1 to 8 inclusive characterised in that said first and second inductors comprise: a cylinder of magnetically permeable material (260,270), an inner center post, and a disc (300) disposed about said post defining two spaced apart toroidal cavities, in which cavities windings (280,290) of said first and second inductors are respectively located.

10. An electric ignition assembly as claimed in any one of Claims 1 to 9 inclusive characterised in that a fusible link (70) is connected in a series with said first inductor.

11. An electric ignition assembly as claimed in any one of Claims 1 to 10 inclusive characterised in that a tertiary winding (340) is magnetically coupled to at least one of said first and second inductors and connected in series with a fusible link (350).

12. An electric ignition assembly as claimed in any one of Claims 1 to 11 inclusive included in an explosives detonator and casing (101) therefor, the ignition element of the assembly being an electrical fusehead (40) for said explosives detonator.

VI. Furthermore, in his letter of 11.11.83 the applicant requested that if Claim 1 were held unallowable by the Board of Appeal a European patent should be granted on the basis of Claim 3. With respect to this claim the applicant contends essentially that the combination of leakage and dissipation means was not obvious and that, in particular, the use of a resistor having a relatively low value was not disclosed in the documents reflecting the prior art (e.g. US-A-3 762 331).

Reasons for the Decision

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1. The appeal complies with Article 106 to 108 and Rule 64 EPC and is, therefore, admissible.
 2. The present application aims to avoid the undesired ignition of fuse heads by spurious sources of electrical energy such as induced stray high frequency radiation

and capacitor discharge, so that the fusehead will only be ignited by electrical energy of predetermined magnitude and frequency.

3. From US-A-3 185 093 an electric ignition assembly is known as described in the precharacterising part of claim 1.
4. It is generally known that in order to obtain a high coefficient of mutual coupling k (i.e. an almost complete coupling) between two inductors the two inductors must be as close as possible to one another (preferably even interleaved) and that an iron core having a high permeability must be used, preferably a core closed in itself. Under such circumstances values of k as high as 0.998 may be arrived at.
5. Considering the different embodiments shown in the US-Patent, it is clear to the person skilled in the art that in many of them a complete coupling cannot be obtained, even ignoring the presence of the closed shield which will cause a decreasing coupling between the two inductors with increasing frequency. In particular in the embodiments according to Fig. 2 and Fig. 9 a non-linked inductance portion is clearly present (cf. column 5, lines 65-71 and column 7, lines 8-13; the text erroneously refers to Figs. 3, 4 and 11 instead of 2, 3 and 9). Even if these embodiments may not be regarded by the author of the US-Patent as preferred ones, they are nevertheless disclosed.

Therefore, it is not possible to accept the applicant's contentions that in the transformers according to the US-Patent there is virtually complete flux linkage be-

tween the inductors, or that at least a coefficient of coupling as high as possible should be achieved. In column 4, lines 37-42 of this document no more is said than that "arrangements which provide sufficient changing magnetic flux" may be utilised.

6. Although the invention claimed in the US-Patent rests on the use of a conductive closed shield between the two inductors, this document also discloses transformers without such a shield, see Fig. 11, graph I(b)*2, 1 with corresponding text (column 7, lines 44-75; column 8, lines 1-8) and Fig. 12, graph IV with corresponding text (column 8, lines 30-36, 57-62).

These transformers are used for comparison purposes to show the improvements which can be obtained by using a conductive shield. The graphs referred to show at the same time, however, that such transformers possess a bandpass characteristic with an appreciable attenuation of high frequency currents. Apparently the author of the US-Patent does not consider this as sufficient for his purposes but he points out that also an unshielded device provides a cut-off frequency range (col. 5, lines 12-15).

7. It is common knowledge of the man skilled in the art that transformers having leakage inductance possess the character of a bandpassfilter (cf. e.g. Stefanescu, Les filtres électriques, Masson et cie. Paris, 1972, page 127-133).
8. The person skilled in the art will therefore realise that it is also possible to obtain protection against stray high frequency currents in an ignition assembly in

the absence of a shield by using a transformer having an amount of leakage, (although to a lesser degree than by using a shield). Furthermore, he will be aware that the amount of attenuation is determined by the coefficient of coupling (cf. the cited passage in the book of Stefanescu, in particular Fig. 3.54 on page 131 and corresponding text).

9. With regard to the possible effects of iron losses in explaining the shape of the graphs I(b) *2,1 and IV shown in figures 11 and 12 respectively of US-A-3 185 093 it is observed that, as is well known, the iron losses in a transformer are independent of the secondary load current. Moreover, they are usually small (of the order of a few percent of the power transmitted under full load). The effect of skin effect losses at a frequency of 100 kHz and for a wire diameter of 0,5 mm (No.24 wire) will be barely perceptible.

These losses could thus not possibly account for the voltage drops shown in these graphs, which would inevitably be attributed by the person skilled in the art to the generally known bandpass character of a transformer having a certain amount of leakage flux.

10. The condition k less than 0,9, represents in effect merely the range of values which are usable in practice and no surprisingly favourable effect being present within this range, no inventive step appears to be involved in the use of transformers having a value for k less than 0.9.
11. Claim 1 and claim 2 are therefore not allowable for lack of inventive step.

12. In accordance with applicants request referred to under IV, the Board of Appeal will now consider the allowability of Claim 3, which is directed to the combination of leakage inductance and energy dissipation means. As was confirmed by the applicant in his letter of 11.11.83, Claim 3 embraces the use of a saturable ferromagnetic material and the use of a resistor (80).

13. The use of a saturable ferromagnetic material to provide increased protection against improper fusehead ignition is known from US-A-3 762 331 and it is considered obvious to the man skilled in the art that the same measure could also be applied to ignition devices according to the present application. The combination does produce no more than the sum of the effects which could be expected. For these reasons alone, Claim 3 is already unallowable as no inventive step is involved.

14. With respect to the use of a resistor the following is observed. In his letter of 06.06.83 the applicant has stated that "this resistor must have a low impedance compared with that of the transformer primary inductance and the reflected impedance of the ignition element circuit". In his letter of 11.11.83, however, it is stated that "the resistor value would need to be comparable with the impedance of the transformer and detonator circuit at the lowest frequency at which the additional protection ... is required to begin to take effect". These two conditions, neither of which can be found in the application as filed, do not coincide but even so it is clear that to obtain the desired effect it is essential that the resistance meets certain requirements as to its value.

15. Article 84 EPC requires amongst other things that the claims, which define the matter for which protection is sought (i.e. the object of the invention as implied by Article 52(1) EPC) be clear. The Board of Appeal considers that this has to be interpreted as meaning not only that a claim from a technical point of view must be comprehensible, but also that it must define clearly the object of the invention, that is to say indicate all the essential features thereof.

As essential features have to be regarded all features which are necessary to obtain the desired effect or, differently expressed, which are necessary to solve the technical problem with which the application is concerned.

In the present case, Claim 3 which does not state an essential feature concerning the resistor (80) does in this respect not satisfy Article 84 EPC and is thus not allowable.

16. The applicant asserts that it would be obvious to the person skilled in the art how to choose the value of the resistor in question, which statement seems to imply that it would not be necessary to state any requirement as to the value of the resistor in the claim.
17. In the application as filed it is merely said that the resistor increases energy dissipation at high frequencies (page 23, lines 11-14). Moreover in two letters the applicant himself states two requirements for its value which lead to different results. Under these circumstances, the Board of Appeal cannot accept the applicant's contention that the man skilled in the art would know what value to choose.

18. Rule 66(1) EPC in effect instructs a Board of Appeal to conduct its examination in accordance with the provisions of inter alia Article 96(2) EPC and Rule 51(2) EPC. These provisions leave open the possibility in appropriate cases for the Board to indicate to an applicant that the grant of a European patent based on the subject-matter of certain dependent claims would be favourably considered. Nevertheless, it remains the prime responsibility of the applicant to define in the claims submitted to the Board the subject matter for which he wishes to obtain protection (with alternatives if he so desires).

19. In accordance with Article 113(2) EPC, the Board can only decide upon the European patent application in the text submitted to it or agreed by the applicant. It follows that when deciding the appeal the Board has no authority under the EPC to order the grant of a European patent containing claims which are different from those submitted by the applicant in their content or interdependency. Even if the Board has indicated to an applicant that a dependent claim might be allowable if rewritten as an independent claim but the applicant has not expressly requested the Board to consider it as such claim, the Board is not obliged to do so.

20. In the present case, the Board informed the applicant that Claim 11 (with some modifications) was the only claim which would appear to be allowable, but the applicant in his reply stated that he did not wish to proceed with the application on that basis. The applicant did not effectively rebut the Board's objections to the other dependent claims and only made the auxiliary re-

quest to consider claim 3 as a possible independent claim. Under these circumstances, the Board is of the opinion that the dependent claims 4 to 12, need not be considered separately once it has been established that the independent claim from which they depend is unallowable.

For these reasons,

it is decided that

the appeal against the decision of the Examining Division of the European Patent Office dated 18.09.81 is dismissed.

J. G. G.

G. Korschak

GK

PF

J. G. G.