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D E C I S I O N
of 8 September 1994

Case Number: T 1057/93 - 3.2.1

Application Number: 89909209.2

Publication Number: 0427777

IPC: B60R 16/02, F02P 11/02, F02P 11/04, B60Q 9/00

Language of the proceedings: EN

Title of invention:
PROTECTIVE CIRCUIT FOR BATTERY POWERED ENGINE IGNITION SYSTEM

Applicant:
MOTRONIX LIMITED

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 123(2), 84, 56

Keyword:
"Added subject-matter (after amendment - no)"
"Clarity (after amendment - yes)"
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1057/93 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 8 September 1994

Appellant: MOTRONIX LIMITED
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Decision under appeal: **Decision of the Examining Division of the European Patent Office dated 20 September 1993 refusing European patent application No. 89 909 209.2 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: F. A. Gumbel
Members: P. Alting van Geusau
J. C. M. de Preter

Summary of Facts and Submissions

I. European patent application No. 89 909 209.2, filed as international patent application PCT/GB89/00867 and published as WO 90/01435, was refused by decision dated 20 September 1993 on the grounds that the subject-matter of Claim 1 filed with letter of 7 April 1993 contained subject-matter which extended beyond the content of the application as filed (Article 123(2) EPC) and also that this subject-matter lacked an inventive step (Article 56 EPC) having regard to the prior art disclosed in

D1: US-A-3 646 354

and the expertise of the skilled person.

In particular, the Examining Division took the view that it was not disclosed in the application documents as originally filed that the protective circuit was an entirely solid state circuit as was stated in the then effective Claim 1, lines 12 and 13.

In respect of lack of inventive step the Examining Division was of the opinion that the features which distinguished the subject-matter of the Claim from the system disclosed in D1 concerned an obvious combination of, functionally non-related, known features.

II. Notice of appeal was filed against this decision on 16 November 1993, payment of the appeal fee was registered on 17 November 1993.

The Statement of Grounds of Appeal was filed on 10 December 1993.

III. By communication dated 20 April 1994 the Board informed the Appellant that rather than being amended in a manner to infringe the requirements of Article 123(2) EPC the claims merely appeared to lack clarity and consistency and as such did not appear to be acceptable for reasons of Article 84 EPC. Furthermore the independent Claim was not drafted in accordance with Rule 29(1) EPC to take account of the closest prior art disclosed in D1, which deficiency was another ground for the non-acceptability of the claims.

However, the Board was further of the opinion that the subject-matter of the application would appear to include inventive subject-matter and gave suggestions for new Claims and an adapted description so that, in case the Appellant filed new documents amended accordingly, the application could be forwarded to grant.

IV. With letters dated 26 August 1994 and 16 June 1994 the Appellant filed new Claims 1 to 6 (partly) and amended description pages 1 to 2a, respectively Claims 6 (partly) to 9 and amended description pages 3 and 4.

The Appellant requests grant of a patent on the basis of these new documents together with the originally filed description pages 5 to 13 and Figures 1 to 3.

Current Claim 1 reads as follows:

"An electrical control circuit for a vehicle, boat, aircraft or hovercraft wherein a battery is to be used to energise a starter motor and an ignition system of an internal combustion engine and the engine is connected to drive an alternator (3) by means of which the battery can be charged whereby, if the battery is inadvertently left connected to a load when the engine is not running,

it may discharge to a level at which starting of the engine is no longer possible, the electrical control circuit comprising a protective circuit (5) which includes first and second terminals (T4, T5) for connection with the battery and load including the engine's ignition system, switching means (Q2) connected between said terminals, means (I^4, I^5, IC2b) responsive to the battery voltage when connected thereto for automatically switching the switching means (Q2) to break the connection between said terminals (T4, T5) when the battery has discharged to a voltage level at which there is yet sufficient charge remaining to start the engine, the electrical control circuit further comprising manually operated means (8,7) actuating a switch (9) external to the protective circuit for switching the switching means ON to make the connection between said terminals (T4, T5), whereby the user can manually reset the switching means from OFF to ON to enable the engine ignition system to be activated by the battery when it is partially discharged, characterised in that the protective circuit is a solid state circuit, the switching means is a bi-stable switching transistor (Q2) and the protective circuit comprises a voltage multiplier (M, IC2a, DP) for maintaining a sufficient and stable voltage to control the switching transistor (Q2) irrespectively of varying load currents and battery voltage, and in that the manually operated means are operable to actuate the switch (9) to switch the switching transistor (Q2) OFF to break the connection between said terminals".

V. In support of his request the Appellant submitted essentially the following arguments:

The amendment considered to infringe Article 123(2) EPC e.g. that the protective circuit is a solid state circuit, essentially concerns the highlighting of a

technical difference between the invention and the prior art disclosed in D1 and merely explains in words something that was so obvious from the circuit diagrams disclosed in the application that it was regarded as not worth mentioning. Considering the circuit diagrams of Figures 2 and 3 there are no electro-mechanical components such as relays, no vacuum, liquids or gases and no moving parts whatsoever involved so that, taking into account the usual meaning of the term "solid state circuit" this term entirely applies to the circuits disclosed in the application.

Moreover, further specification of features of the invention is a normal process in the course of examination and also in this respect this amendment should be fully acceptable.

The invention provides improved means for the protection of a battery-powered engine ignition system against inadvertent discharge of the battery involving substantially lower current consumption than has been possible in the prior art and thereby enabling the engine to be left for much longer periods than has been possible in prior proposals without the battery being inconveniently discharged. Moreover the circuit claimed provides the user with the possibility to disable the ignition system manually as part of an anti-theft vehicle immobilisation device.

The concept of the present invention is not only totally original and novel, but is also not obvious to anyone skilled in the art and therefore Claim 1 should be considered to comprise patentable subject-matter .

Reasons for the Decision

1. The appeal complies with the requirements of Articles 106 to 108 and Rules 1(1) and 64 EPC. It is admissible.

2. *Amendments*

2.1 Claim 1 is based on the originally filed Claim 1 and contains further details of the control circuit disclosed in Figure 1 and the protective circuit, forming part of the control circuit, shown in Figures 2 and 3.

In particular it is clarified that the control circuit comprises:

a protective circuit 5 which provides for automatically switching a bi-stable switching transistor Q2 to break the connection to a load 15 including the ignition system 4 to the battery 1 when the battery has discharged to a voltage level at which there is yet sufficient charge remaining to start the engine by means of the starter motor 2 (see the original description page 5, lines 5 to 14 and page 6, lines 14 to 28), automatic switching being guaranteed by a voltage multiplier M, IC2a and DP (see page 9, line 23 to page 10, line 11) for maintaining a sufficient and stable voltage to control the switching transistor Q2 irrespective of varying load currents and battery voltage,

a switch 9 for switching the battery ON or OFF the load including the ignition system (see Figure 1 and description page 5, lines 15 to 20) and

manually operated means 7, 8 (see page 5, lines 24 to page 6, line 13) for actuating the switch.

2.2 The rejection of the patent application was based on non-compliance with Article 123 (2) EPC in respect of

(a) the newly introduced feature "the circuit is an entirely solid state circuit" and

(b) an amendment of "a battery-powered engine ignition system" into "a battery-powered internal combustion engine".

(a) The protective circuit defined in Claim 1 essentially comprises a switching transistor (Q2), voltage reference means for automatically switching the transistor off and

a voltage multiplier, which constituents, as will be clear from the embodiments disclosed in respect of Figures 2 and 3, all make use of semi-conductor devices for their active functioning.

In the electronic art the skilled person would generally interpret "a solid state circuit" as a circuit in which the active elements are semi-conductors and not electron tubes or relays and in this respect reference can also be made to the Websters Dictionary (ISBN 0-87779-508-8).

Whether some non-active elements in the circuit are trimpotentiometers or other, strictly speaking, non "solid-state" elements can generally not be seen as inconsistent with the indication that the circuit as a whole is "a solid state circuit". However, "entirely" was omitted in the current clarified Claim 1 and thus avoids the suggestion that only semiconductors are present in the protective circuit.

(b) In the current Claim 1 it is now clarified that the battery is used to energise a starter motor and an ignition system of an internal combustion engine. This subject-matter follows directly from the circuit shown in Figure 1.

In view of the above assessments no objections in respect of Article 84 and Article 123(2) EPC arise against current Claim 1.

2.3 The current Claim 1 is drafted in accordance with Rule 29(1) EPC to comprise in the precharacterising part the features which, in combination, form part of the closest prior art (US-A-3 646 354) and therefore also in this respect meets the requirements of the EPC.

2.4 The current dependent Claims 2 to 9 concern further details of the control circuit which are fully specified in the application as originally filed. The content of these claims is clarified so that these Claims give no rise to objections under Article 84 EPC either.

2.5 The description was amended to include a reference to the closest prior art (D1) and the object of the invention was specified in regard to this prior art. The description also meets the requirements of the EPC, in particular those of Rule 27(1)(b) and (c) EPC.

3. *Prior art and novelty*

3.1 The closest prior art is disclosed in D1 which relates to an electrical supervisory control of a battery of a vehicle. In this known control a transistor 20 forms part of battery voltage sensing means. When the battery voltage falls under a predetermined limit the transistor stops conducting and a relay 24, controlled by the transistor, will drop out, thereby opening all loads to

the battery (see column 2, lines 55 to 60). The control circuit contains a reset button 38 which connects the remaining battery voltage directly through the winding of the relay to ground, thereby causing the relay to be energised (see column 3, lines 25 to 34). This known control represents the combination of precharacterising features of Claim 1.

When comparing the known control circuit disclosed in D1 and the control circuit claimed in Claim 1 of the present European patent application the following differences remain:

i) the protective circuit is a solid state circuit

ii) the switching means is a bi-stable switching transistor and

iii) a voltage multiplier is present for maintaining a sufficient and stable voltage to control the switching transistor irrespectively of varying load currents and battery voltage and

iiii) the manually operated means are operable to actuate the switch (9) to switch the switching transistor OFF to brake the connection between said terminals.

3.2 The further prior art cited in the international search report concern a battery discharge warning system (GB-A-2 072 966), an electronic engine control system with an emergency operation mode which is activated upon sensing of low operation voltage (US-A-4 531 190), an encoded electrical control system comprising a transmitter and a receiver for providing a necessary electrical connection to the ignition system of a vehicle (US-A-4 141 332), an anti-theft system with an

ignition suppressor which is operated by means of infrared receiver and transmitter units (EP-A-0 203 262), an ignition system for a vehicle which is activated by means of an encoded signal (DE-A-3 609 718) and an electrical control apparatus for equipment installed in a vehicle comprising switching circuits for interrupting electrical connections to the equipment and which is activated when the supply voltage is lowered below predetermined levels (US-A-4 736 145).

None of these prior art documents comprises the combination of precharacterising features of Claim 1 or the characterising features indicated above by ii) to iiii).

3.3 The further cited US-A-4 841 944 specification has a publication date 27 June 1989. Since the present application has a valid priority of 1 August 1988, in accordance with the provisions of Article 89 this date shall count as the filing date of the European patent application for the purpose of in particular Article 54 (2) and (3) EPC and therefore the content of US-A-4 841 944 does not have to be taken into account for the assessment of either novelty or inventive step.

3.4 Novelty of the subject-matter of Claim 1 can be concluded because, in view of the above assessments, none of the cited prior art documents discloses the full combination of all the features of Claim 1.

4. *Inventive step*

4.1 In comparison to the control disclosed in D1, the electrical control circuit in accordance with Claim 1 has a substantially lower current consumption (features i and ii) thereby enabling a motor vehicle to be left for much longer periods unattended without the battery

being inconveniently discharged, while the functioning of the control is independent of varying loads or voltages (feature iii). Furthermore the control allows disabling of the ignition system manually (feature iiii) as part of an anti-theft immobilisation device.

The problem to be solved by the subject-matter of the application can therefore be seen in the provision of a control circuit which provides the above indicated improvements with respect to the electrical control circuit known from D1.

4.2 Although the replacement of a solenoid or relay by a switching transistor is, in the Board's opinion, obvious to the skilled engineer due to easy availability of high current switching transistors intended for such a use at the priority date of the present application the further step of adding a voltage multiplier for maintaining a sufficient voltage to control the switching transistor also in case the battery voltage is low or the provision of anti-theft switching means, does not have any antecedent in the cited prior art so that the solution claimed is considered non-obvious in the sense of Article 56 EPC.

4.3 The Examining Division considered that since a voltage multiplier is a standard electronic element for the purpose of providing a higher DC-voltage from a DC-voltage source the use of a voltage multiplier should be considered as obvious.

However, this argumentation does not take into account that, starting from the control circuit disclosed in D1, the skilled person had no reason whatsoever to apply a voltage multiplier. Therefore without any lead with respect to the specific intentions to be achieved the availability of a voltage multiplier in itself does not

make it obvious for the skilled person to apply such a voltage multiplier for the specified use in the control circuit defined in Claim 1.

4.4 The Examining Division further argued that it should be regarded as obvious to a person skilled in the art to provide a manual switching means additionally to automatic switching means in order to have a back-up function.

In this respect it is noted that in the control circuit of D1 there are already additional manual switching means (switch 38) with a parallel function to the relay switch. By means of this switching means the user can manually reset the relay switch from OFF to ON to enable the engine ignition system to be activated by the battery when it is partially discharged (see also the last precharacterising features of Claim 1 of the present application).

However, an additional possibility to break the connection manually also in case the battery voltage is **not** low but rather as a provision of an anti-theft immobilisation of the vehicle, is not hinted to at all. In view of the different effects obtained this function can also not be seen as a "back-up function" of the relay switch in the control circuit of D1.

4.5 Summarising, in the Board's judgment, the proposed solution to the technical problem underlying the patent in suit defined in the independent Claim 1 is inventive and therefore this claim as well as its dependent claims 2 to 9 relating to particular embodiments of the invention in accordance with Rule 29(3) EPC, can form the basis for grant of a patent (Article 52(1) EPC).

Order

For these reasons it is decided that:

1. The contested decision is set aside.

2. The case is remitted to the first instance with the order to grant a patent with the following documents:

   Claim 1 to 6 (partly) and description pages 1 to 2a filed with letter dated 26 August 1994, Claims 6 (partly) to 9 and description pages 3 and 4 filed with letter dated 16 June 1994, together with the originally filed description pages 5 to 13 and Figures 1 to 3.

The Registrar: The Chairman:

S. Fabiani F. Gumbel