Europäisches Patentamt | European Patent Office | Office européen des brevets
Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 64 / 84

T194

DECISION
of the Technical Board of Appeal 3.2.1
of 22 October 1984

Appellant: Osborn, Norbert L.
402, West Grauwyler
Irving Texas 75 061 (US)

Representative: Grundy, Derek George Ritchie
CARPMAELS & RANSFORD
43, Bloomsbury Square
London WC1A 2RA (GB)

Decision under appeal: Decision of Examining Division 102 of the European Patent Office dated 14 October 1983 refusing European patent application No 80 303 326.5 pursuant to Article 97(1) EPC

Composition of the Board:
Chairman: G. Andersson
Member: M. Huttner
Member: P. Ford

SUMMARY OF FACTS AND SUBMISSIONS

I. European Patent Application No. 80 303 326.5 filed on 23 September 1980, published on 29 April 1981 under publication Nr. 0 027 689 and claiming priority of 25 September 1979 and 19 February 1980 from two previous applications filed in the United States of America, was refused by decision of the Examining Division 102 of the European Patent Office, dated 14 October 1983. That decision was based on the method claims 1 to 3 and apparatus claims 4 to 19 received on 2 May 1983.

II. The reasons given for the refusal were that the subject matter of each of the independent claims 1 and 4 did not involve an inventive step since the publication FR-E-59 569 also discloses a method of powering a vehicle using a supercharged internal combustion engine whereby a mixture of a first fuel and air and a mixture of a second fuel and air are supplied, the second fuel having a relatively high temperature drop upon vaporisation. Further, it was also not only common knowledge in the art to use a supercharger for down-sizing an internal combustion engine to less than the size of one which is normally aspirated but also to supply a substantially stoichiometric mixture of fuel and air to the engine, and it was likewise commonly known in the technical field of automative engines to operate the engine on the normal fuel air mixture at a predetermined operating level and to add the second fuel air mixture above said operating level.

III. On 13 December 1983 the appellant lodged an appeal against this decision by telex, which was followed by a confirmation letter, the payment of the fee and a Statement of Grounds, all received within the prescribed time limits. The appellant asserted that FR-E-59 569 nowhere discloses a suggestion to apply a dual fuel arrangement for the purpose of down-sizing the engine size as compared to that which is required of a naturally aspirated engine and that in the common engine practice it was only known to down-size racing car engines by way of using superchargers but without the combination with a dual fuel arrangement. Such engines required lower cylinder compression ratios and extremely high octane fuel together with retarded ignition timing and inner coolers. It is therefore the appellant's position that the skilled person would not be lead to the use of a turbo-charger with a dual fuel arrangement coupled with substantially down-sizing the engine's volumetric displacement, as claimed in the present application. In support of these assertions the appellant submitted an affidavit dealing in detail with FR-E-59 569 and the art commonly known.

IV. By a communication dated 17 July 1984, the appellant was advised that the subject matter of both Claim 1 and 4 would be obvious because the mere difference from FR-E-59 569, such as the selection of a down-sized engine having a volumetric displacement less than 75% of the size normally required to drive the same vehicle, is in conformity with the design trends in automobile engines at the time of filing, which forced engine builders to search for ways and means to reduce the fuel consumption of motor cars and it was only logical for the skilled person to refrain from boosting the power in favour of the engine's down sizing.

On 10 September 1984, the appellant submitted some suggestions as to how the description and the drawings could be amended together with a set of new method claims 1 to 8 including a further independent claim 7.

The effective claim 1 reads as follows:

1. A method of operating an internal combustion engine to achieve a power output greater than that of a naturally aspirated engine of a specified volumetric displacement comprising:

selecting an internal combustion engine having a volumetric displacement less than 70% the size of the specified volumetric displacement,

supplying a mixture of a first fuel and air and a mixture of a second fuel and air to the engine, said combined mixtures being a stoichiometric mixture of the two fuels with air, the second fuel having a higher temperature drop upon vaporization than that of the first fuel, and

supercharging the engine to a boost pressure required to achieve a power output equal to or greater than that provided by the specific volumetric displacement engine.

The other independent claim 7 reads as follows:

7. A method of selectively operating an internal combustion engine to produce a maximum power that is equal to or greater than 43% more than the maximum power of said engine when naturally aspirated comprising:

supplying a mixture of the first fuel and air and a mixture of a second fuel and air to the engine, said combined mixtures being a stoichiometric mixture of the two fuels with air, the second fuel having a higher temperature drop upon vaporization than that of the first fuel,

supercharging said engine to a boost pressure required to achieve a power output which is equal to or greater than 43% more than the maximum power of the naturally aspirated engine.

The appellant requested that the impugned decision be set aside and a European Patent based on these amended documents be granted. He further requested the reimbursement of the appeal fee.

V. For the original claims and description reference should be made to publication No. 0 027 689.

REASONS FOR THE DECISION

1. The appeal complies with Article 106 to 108 and Rule 64 EPC and is, therefore, admissible.

2. The subject matter of Claim 1 proves to be new in view of the fact that there is no method disclosed in the prior art to achieve a power output greater than that provided by a naturally aspirated engine of a specified volumetric displacement by selecting an engine having a displacement less than 70% of the said specified displacement. The same applies to the subject matter of Claim 7, since no method of boosting the

power to equal to or greater than 43% of a naturally aspired engine which is supercharged with two stoichiometric mixtures of two fuels with air is known from the prior art.

3. The appellant has not disputed that the method disclosed in FR-E-59 569 represents the closest prior art from which the invention sets out. It discloses a method of powering a vehicle using a supercharged internal combustion engine which is supplied with a first and second fuel and air mixture and it is stated in point 3 of the Résumé that these mixtures are of normal strength, i.e. of chemically correct mixture. The appellant has not disputed that such qualification is synonymous with a substantially stoichiometric mixture. The second fuel-air mixture, being an anti-detonant, containing alcohol and added to the first fuel when the engine is working in severe operating conditions (high loads) undoubtedly exhibits a relatively high temperature drop upon vaporisation. This not only reduces detonation but also entails the cooling of the air-fuel mixture aspirated by the engine as a bonus effect and thus a lower charge temperature allowing for a more dense and greater mass flow through the cylinder. Thus, as the skilled person may readily gather, these measures allow higher boost pressures produced by the supercharger to levels made possible by the beneficial cooling and anti-knock properties of alcohol. Therefore, it cannot be denied that FR-E-59 569 actually features a supercharged engine with said dual fuel arrangement for affording a considerable increase of efficiency and power-output. This conclusion is corroborated when the citation is read and properly interpreted in conjunction with the

first paragraph of the main patent FR-A-843 930 to which it closely relates. The appellant has admitted that FR-E-59 569 does concomitantly aim at a higher power-output.

Therefore, Claim 1 differs from FR-E-59 569 merely by the feature of selecting an internal combustion engine having a volumetric displacement of less than 70% of the size of a specified volumetric displacement, while Claim 7 can be distinguished from said citation by supercharging to a boost pressure required to achieve a power-putput which is equal to, or greater than 43% more than the maximum power of a specified naturally aspirated engine. Thus, the subject matter of both Claim 1 and 7 is novel (Article 54 EPC).

4. The question now to be considered is whether the method according to Claim 1 still involves an inventive step. From the assessment of the matter, the following points emerge:

4.1 While it holds true that FR-E-59 569 explicitly teaches the use of an alcohol-air mixture as a second fuel in order to prevent knocking at high engine power-outputs, it nevertheless, as pointed out in point 3 above, becomes immediately evident that the ultimate purpose of that measure is to achieve an increased supply pressure ratio leading inevitably to higher power-output and efficiency.

4.2 It has been brought to the attention of the appellant that it has been proven to be the trend in automobile engines to meet the demand for ever more powerful engines until 1974 and that this trend has been

abruptly brought to an end and even reversed by the drastically inreased fuel prices in the wake of the first oil crisis of 1973. This becomes clearly evident from page 285 of the "McGraw-Hill Encyclopedia of Science and Technology", 5th edition, and, as a consequence, the designers of internal combustion engines were forced to search for ways and means to reduce the fuel consumption also of passenger automobiles. Hence, fuel economy has become of paramount importance, rather than further boosting power output. This means, logically, smaller cars and reduced engine dimensions with the environmental bonus of emitting a smaller volume of undesirable combustion products.

4.3 These tendencies are clearly reflected in the article of C.E. Wise, entitled "Turbo chargers may clean auto-engine exhaust" in "Machine Design", vol. 43, No. 17, 8 July 1971, pages 20 to 23, and, it is explicity stated that engine down-sizing has to be seen as an obvious alternative to boosting the power output potential. To emphasise this, the author specifically points out that in a given example, a 500 cu.in. normally aspirated engine could readily be replaced by a 350 cu. in. engine fitted with a turbo-charger. Therefore, it would appear only logical for the person skilled in the art to refrain from boosting the power, as implemented by FR-E-59 569, in favour of down-sizing the engine as recommended in the Wise article referred to above.

4.4 Consequently, according to the trend prvailing in the relevant technological field, the step of modifying the supercharged internal combustion engine already incorporating a dual fuel arrangement as shown by

FR-E-59 569 so as to reduce the engine displacement, merely constitutes a worthwhile or even imperative alternative to increasing the power output, apart from the fact that a mere change of size, unless there is a new and unexpected result, must be considered as obvious and such new and unexpected result has not been made evident in the present case.

4.5 While it holds true that the supercharging of spark ignition engines was first inroduced in racing cars, it nevertheless was also introduced in passenger vehicles on a commercial scale with the model "Saab 99 Turbo", by Saab, Sweden, as early as 1977 (see Braböckers Lexikon, pages 102 and 103), and this even without the addition of an inner cooler and still retaining the standard ignition timing. The appellant has not been able to repudiate these facts and hence the arguments relied upon by the appellant are not sufficiently persuasive.

4.6 With respect to the degree of down-sizing claimed, it must be born in mind that the down-sizing of the volumentric displacement to 350 cu. in. from well over 400 to 500 cu. in. has been suggested in the article of "Machine Design" referred to above for merely a supercharged engine, which reduction amounts, at the most, to 30% - as incidentally, Mr. Woods' Affidavit confirms - thus already corresponding with 70% of the displaceement of the respective normally aspirated engine even without a dual fuel arrangement.

Hence, it appears only logical that with an engine accordingly fuelled, the size could readily be decreased beyond the 30% possible with a merely supercharged engine, which means that one would arrive at a

volumentric displacement of definitely less than 70% of the size of a comparable naturally aspirated engine as claimed in claim 1.

Consequently, the degree of down-sizing as claimed therein is well within the range plainly to be expected by the skilled person of an ignition type engine fuelled as set out in FR-E-59 569 and such down-sizing merely constitutes a change in degree of a device which has to be considered as the normal result of the exercise of engineering ability and skill. Thus the down-sizing to less than 70% would appear to be obvious for these reasons, which, as a consequence, renders the subject matter of Claim 1 obvious.

4.7 For all these reasons the subject matter of Claim 1 fails to involve an inventive step as required by Article 56 EPC and therefore it cannot be allowed (Article 52(1) EPC).

5. The method Claims 2 to 6 are dependent on claim 1 have as subject matter special embodiments of the invention according to Claim 1. They are not allowable since their acceptance is contingent on the allowability of Claim 1, which has been denied.

6. Claim 7 is an independant claim which, since it contains no requirement for the down-sizing of the engine, is even broader in scope than Claim 1. It covers the case of power increase which is implicit in the most pertinent cited prior art. The objections to its lack of inventive step are therefore even stronger than those to Claim 1. Claim 8, which is dependent on it, necessarily falls with it. In consequence, the entire application must be rejected.

7. The requested reimbursement of the appeal fee, for which the appellant has shown no cause, may only be ordered in a case in which the appeal is deemed to be allowable. This requirement is not met in the present case.

ORDER

For these reasons, it is decided that:

The appeal against the decision of the Examining Division of 14 October 1983 is dismissed.

The Registrar: The Chairman