

The opinion in support of the decision being entered today was **not** written for publication and is **not** binding precedent of the Board.

Paper No. 29

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KENJI MORI, NAOKI TSUCHIDA
and HIROYUKI TSUZUKA

Appeal No. 2002-1853
Application No. 09/340,339

HEARD: March 19, 2003

Before COHEN, ABRAMS, and FRANKFORT, Administrative Patent Judges.
ABRAMS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1 and 3-23, which are all of the claims pending in this application.

We AFFIRM.

BACKGROUND

The appellants' invention relates to a cylinder head arrangement for an internal combustion engine. An understanding of the invention can be derived from a reading of exemplary claim 1, which has been reproduced below.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Tsuchida (Tsuchida '038)	5,529,038	Jun. 25, 1996
Fujieda <u>et al.</u> (Fujieda)	5,666,916	Sep. 16, 1997
Tsuchida <u>et al.</u> (Tsuchida '638)	5,799,638	Sep. 1, 1998

Claims 1, 3-10 and 13-23 stand rejected under 35 U.S.C. § 103 as being unpatentable over Tsuchida '638 in view of Fujieda.

Claims 11 and 12 stand rejected under 35 U.S.C. § 103 as being unpatentable over Tsuchida '638 in view of Fujieda and Tsuchida '038.

Rather than reiterate the conflicting viewpoints advanced by the examiner and the appellants regarding the above-noted rejections, we make reference to the Answer (Paper No. 22) for the examiner's complete reasoning in support of the rejections, and to the Brief (Paper No. 21) and Reply Brief (Paper No. 23) for the appellants' arguments thereagainst.

OPINION

In reaching our decision in this appeal, we have given careful consideration to the appellants' specification and claims, to the applied prior art references, and to the respective positions articulated by the appellants and the examiner. As a consequence of our review, we make the determinations which follow.

The objective of the appellants' invention is to place the fuel injector in a fuel injection type internal combustion engine in a location where the fuel is not directed at the spark plug, so that spark plug wetting and fouling is prevented (specification, pages 1 and 2). Claim 1, the sole independent claim, sets forth the invention in the following manner:

1. A cylinder head arrangement for an internal combustion engine and combustion chamber configuration therefore, said arrangement comprising a cylinder head, cylinder block assembly comprised of a cylinder bore closed at one end by a dome shaped continuous surface of said cylinder head to define a combustion chamber along with a piston that reciprocates in said cylinder bore, at least a pair of intake valve seats formed in said cylinder head combustion chamber dome shaped continuous surface on one side of a plane containing the axis of said cylinder bore, at least a pair of exhaust valve seats are formed in said cylinder head combustion chamber dome shaped continuous surface on the other side of said plane, a spark plug and a fuel injector mounted in said cylinder head and projecting through said combustion chamber dome shaped continuous surface and in open communication with said combustion chamber, said spark plug being positioned in a location so that its spark gap is disposed vertically above a discharge nozzle of said fuel injector and away from the path of fuel injected therefrom for insuring that fuel sprayed from said fuel injector will be directed away rather than toward said spark plug gap.

It is the examiner's view that all of the subject matter recited in claim 1 is disclosed in Tsuchida '638 except for the required positioning of the spark gap vertically above the fuel injector nozzle. However, the examiner has taken the position that such an arrangement is disclosed by Fujieda, and it would have been obvious to one of ordinary skill in the art to modify Tsuchida '638 to meet the terms of claim 1 in view of Fujieda, suggestion being found in Fujieda's explicit teaching that problems are caused if the spark plug gets wet with fuel spray. While we have carefully considered the arguments presented by the appellants in opposition, they have not persuaded us that the examiner's conclusion was in error.

The initial burden of establishing a basis for denying patentability to a claimed invention rests upon the examiner. See In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984). The question under 35 U.S.C. §103 is not merely what the references expressly teach but what they would have suggested to one of ordinary skill in the art at the time the invention was made. See Merck & Co. v. Biotech Labs., Inc. 874 F.2d 804, 807, 10 USPQ2d 1843, 1846 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989) and In re Keller, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). While there must be some suggestion or motivation for one of ordinary skill in the art to combine the teachings of references, it is not necessary that such be found within the four corners of the references themselves; a conclusion of obviousness may be made from common knowledge and common sense of the person of ordinary skill in

the art without any specific hint or suggestion in a particular reference. See In re Bozak, 416 F.2d 1385, 1390, 163 USPQ 545, 549 (CCPA 1969). Insofar as the references themselves are concerned, we are bound to consider the disclosure of each for what it fairly teaches one of ordinary skill in the art, including not only the specific teachings, but also the inferences which one of ordinary skill in the art would reasonably have been expected to draw therefrom. See In re Boe, 355 F.2d 961, 965, 148 USPQ 507, 510 (CCPA 1966) and In re Preda, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968).

There is no dispute that Tsuchida '638 discloses all of the subject matter recited in claim 1, except that the spark plug gap and the fuel injector nozzle appear to be vertically aligned (Figures 2 and 8). Thus, the primary reference fails to disclose or teach the requirement in claim 1 that the spark plug gap be

disposed vertically above a discharge nozzle of said fuel injector and away from the path of fuel injected therefrom for insuring that the fuel sprayed from said fuel injector will be directed away rather than toward said spark plug gap.

Fujieda discloses an internal combustion engine having a fuel injector and a spark plug. In describing the embodiment shown in Figure 2, Fujieda states

if the ignition plug 14 is disposed too close to the [injector] spray, the ignition plug 14 gets wet with the spray, so that incomplete ignition may be caused. Therefore, it is important to properly determine the above positional relation (column 4, lines 19-23).

Thus, Fujieda has recognized the same problem as the appellants, and teaches that it can be solved by so locating the spark plug gap with respect to the fuel injector spray that the plug is not wetted by the spray. In the embodiment of Fujieda's Figure 2, the cone of injected fuel from fuel injector 13 is narrow, and spark plug 14 is so located that the gap is not within cone of sprayed fuel, albeit that the gap is vertically lower than the fuel injector. However, in the embodiment of claim 4, wherein the cone of injected fuel is wide, the spark plug gap is positioned vertically above the cone of sprayed fuel, in the same manner as in the appellants' invention. Thus, both embodiments avoid the problem of wetting the plug gap.

From our perspective, one of ordinary skill in the art would have found it obvious, in view of the explicit teachings of Fujieda quoted above taken with the showings of the embodiments of Figures 2 and 4, to modify the Tsuchida '638 engine to locate the spark plug gap vertically above the fuel injector nozzle so that wetting the spark plug with fuel from the injectors is avoided in order to prevent incomplete ignition of the fuel. This being the case, it is our conclusion that the combined teachings of these two references establish a prima facie case of obviousness with regard to the subject matter recited in claim 1, and we will sustain the rejection.

The appellants' argument that this teaching of Fujieda is inapplicable to the situation at hand because it is disclosed in the context of an engine in which a pre-combustion chamber is used is not persuasive because claim 1 contains no limitation

as to type of combustion chamber. Moreover, there is no evidence to support a conclusion that one of ordinary skill in the art would have considered the Fujieda teaching to be applicable only to engines having pre-combustion chambers. In this regard and in the absence of evidence to the contrary, it seems to us that Fujieda's teaching that wetting the spark plug with fuel from the injector causes incomplete combustion would be applicable to virtually any type of spark-fired internal combustion engine.

Since the appellants have chosen to group claims 3, 4, 7-10, 13, 14 and 17-21 with claim 1 (Brief, page 3), the rejection of these claims also is sustained.

Dependent claim 5 recites the limitation that the fuel injector and the spark plug are disposed at acute angles to the cylinder bore axis. Such an arrangement is disclosed by Tsuchida '638 in Figure 8, and therefore we will sustain the rejection of this claim as being unpatentable over Tsuchida '638 and Fujieda. We reach the same result with regard to claim 15, which also contains that limitation.

Dependent claim 6 adds to claim 5 the requirement that the acute angle of the fuel injector to the cylinder bore axis be greater than that of the spark plug. This feature also is disclosed in Tsuchida '638, the primary reference, in Figure 4, and thus the rejection of this claim is sustained. The same limitation appears in claim 16, and we also will sustain that rejection.

Claim 22 adds to claim 1 the requirement that the cylinder head be formed with a cooling jacket, and at least one tubular member extend through the cooling jacket and receive at least one of the spark plug and the injector. The examiner is of the view that such an arrangement is shown in Figures 1-9 of Tsuchida '638 (Answer, page 6). While cooling passages in the head are not identified in the text of this reference, it is our opinion that one of ordinary skill in the art would have appreciated that a cooling jacket is present in Figures 2, 3 and 7 in the form of unnumbered cavities in the cylinder head (the numeral 55 is located in such a cavity in Figure 3), through which tubular members containing a spark plug and an injector extend. The appellants have not argued that Tsuchida '638 fails to disclose the claimed cooling passages and tubular members, but have stated only that "the examiner has not really discussed this feature of the invention" (Brief, page 5). In the absence of an explanation by the appellants of why Tsuchida '638 fails to disclose the structure added to claim 1 by claim 22, we will sustain this rejection. Claim 23 depends from claim 22 and calls for both the fuel injector and spark plug to be so mounted. As we pointed out above, this appears to be the case in Tsuchida '638, and we will sustain the rejection of this claim on the same basis as claim 22.

Claims 11 and 12 stand rejected as being unpatentable over the two references cited against claim 1 et al., taken further with Tsuchida '038. Claim 11 is a dependent claim which requires that the cylinder head arrangement contain a pair of spark plugs.

Tsuchida '038 has been applied for showing this feature, and it is the examiner's position that it would have been obvious to additionally modify the engine of Tsuchida '638 to have two spark plugs. As shown in Figure 4 of Tsuchida '038, a pair of spark plugs 75 flanks each fuel injector 66, and the examiner points out with reference to column 5, lines 7 and 8, that this arrangement causes the fuel charge to be dispersed toward the spark plug gaps "so as to ensure complete combustion." The only argument made by the appellants with regard to this rejection is that the spark plugs in Tsuchida '038 are located vertically below the fuel injector, and therefore the reference teaches away from the claimed invention (Brief, page 5). However, Tsuchida '038 was not cited for teaching the claimed location of the spark plug gaps; as explained above, that feature is taught by Fujieda. We will sustain the rejection of claim 11. Claim 12 having been grouped with claim 11, its rejection also is sustained.

CONCLUSION

Both of the rejections are sustained.

The decision of the examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

IRWIN CHARLES COHEN)	
Administrative Patent Judge)	
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