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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte BERND STEINER,
THOMAS LORENZ, and JAN MEHRING

Appeal 2015-003266
Application 13/648,945
Technology Center 3700

Before JAMES P. CALVE, LISA M. GUIJT, and BRADLEY B. BAYAT, *Administrative Patent Judges*.

CALVE, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134 from the final rejection of claims 1–14, 16–19, and 21. Claims 15 and 20 are cancelled. Appeal Br. 27–28 (Claims Appendix). We have jurisdiction under 35 U.S.C. § 6(b). Appellants' representative appeared for oral hearing on May 15, 2017.

We REVERSE.

CLAIMED SUBJECT MATTER

Claims 1, 10, and 16 are independent. Claim 1 is reproduced below.

1. An internal combustion engine comprising:
a cylinder head;
a cylinder block connected to the cylinder head, the cylinder block including an upper crankcase portion receiving a crankshaft and a bearing; and
an oil circuit including oil-carrying lines supplying the bearing with oil, the oil carrying lines including an oil gallery connected to a supply line and a pump, the supply line flowing oil to the bearing, at least a portion of an inner wall of the supply line including thermal insulation having shape memory material activated to form a shape lining the inner wall.

REJECTIONS

Claims 1–4, 6, and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Katayama (US 6,557,533 B2, iss. May 6, 2003) and Biris (US 2010/0221473 A1, pub. Sept. 2, 2010).

Claims 5, 10, and 14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Katayama, Biris, and Steiner et al. (US 8,393,311 B2, iss. Mar. 12, 2013).

Claim 7 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Katayama, Biris, and Kato (US 5,517,959, iss. May 21, 1996).

Claim 9 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Katayama, Biris, and Toda (US 2010/0147255 A1, pub. June 17, 2010).

Claims 11 and 12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Katayama, Biris, Steiner, and Rabhi (US 2010/0154748 A1, pub. June 24, 2010).

Claim 13 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Katayama, Biris, Steiner, Burns (US 2009/0272533 A1, pub. Nov. 5, 2009), and Weigelt (US 2009/0313847 A1, pub. Dec. 24, 2009).

Claims 16–18 and 21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Katayama, Biris, Steiner, and Maynard (US 6,278,084 B1, iss. Aug. 21, 2001).

ANALYSIS

Claims 1–4, 6, and 8 as unpatentable over Katayama and Biris

The Examiner found that Katayama teaches an internal combustion engine, as recited in claim 1, except for thermal insulation having a shape memory material, which Biris teaches. *See* Final Act. 3 (citing Biris, Fig. 1 (element 1) ¶ 89). The Examiner determined it would have been obvious to replace the oil line assembly of Katayama with the multilayer tube assembly of Biris and its insulation material to insulate the oil and engine components with a shape memory material that makes the thermal insulation adaptable to a convenient shape. *Id.* at 3–4; Ans. 14–16. The Examiner reasoned that insulating engine components is a common practice, and Biris discloses a multilayer tube assembly, including thermal insulation and shape memory material that can be bent to form a shape lining an inner wall. Ans. 15–16.

Appellants argue that claim 1 requires the inner wall of the supply line to include thermal insulation having shape memory activated to form a shape lining the inner wall, and Biris's inner-most layer is copper tube 1, which is not insulative. Reply Br. 4–5; Appeal Br. 11, 16. Appellants argue that if outer polymeric layer 4 is relied on to show a thermal insulation with shape memory, this layer does not line an inner wall of the tube. Reply Br. 3–4.

The Examiner has not established by a preponderance of evidence that replacing Katayama's oil-carrying lines with the multilayer tube assembly of Biris would result in "a portion of an inner wall of the supply line including thermal insulation having shape memory material," as recited in claim 1. As Appellants point out, the inner wall of Biris's tube assembly is copper tube 1 as shown in Figure 1, which is reproduced below.

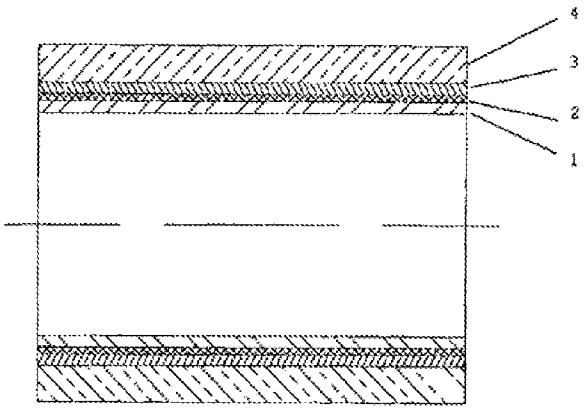

Figure 1

Figure 1 is a cross section of a multilayer tube of Biris having copper tube 1, oxide layer 2, intermediate adhesive layer 3, and outer polymeric layer 4. Biris ¶¶ 43, 51–57. If this multilayer tube replaces oil supply lines of Katayama, as the Examiner proposes (Ans. 15–16), then the inner wall is formed by copper tube 1, which has high thermal conductivity (Ans. 14) and thus is not insulative (Appeal Br. 11). The Examiner's reliance on the other layers of the tube assembly to provide thermal insulation material (Ans. 14) does not explain how the *inner wall* of this tube assembly includes thermal insulation, as claimed. Indeed, the Examiner's finding that "the multilayer tube assembly (Biris (Fig. 1)) has several layers [so that] the assembly as a whole has thermal insulation material" (Ans. 14) does not address how the tube inner wall includes thermal insulation having shape memory material.

Appellants disclose various ways of forming thermal insulation on oil supply lines. The inner walls of the oil-carrying lines may be provided with a polymeric material (e.g., plastic), a ceramic, an oxide layer, or a composite material as the thermal insulation. Spec. 10:20–12:7. Appellants do not disclose any of these materials as shape memory materials, however.

Appellants disclose that the internal combustion engine may include a shape memory material that jointly forms the thermal insulation so thermal insulation is formed using a shape memory material. *See id.* at 12:8–20. Shape memory materials encompass all materials that "have the capability of changing their external form in dependence on the temperature, the magnetic field strength, the hydraulic pressure, to which they are exposed, or the like," and include alloys and ceramics. *Id.* at 12:9–14. For example, a hose made from a shape memory material may be introduced into an oil-carrying line and activated to form thermal insulation on the inner walls. *Id.* at 16:3–10.

We interpret claim 1 to require the thermal insulation to have shape memory material. This interpretation is consistent with claim 1's recitation that the inner wall has "thermal insulation having shape memory material [that is] activated to form a shape lining the inner wall" of the oil lines. This interpretation also is consistent with the Specification, as discussed above.

Because the Examiner *replaces* Katayama's oil supply lines with the multilayer tube assembly of Biris, the inner wall is copper tube 1, which the parties agree does not provide thermal insulation. Ans. 14; Appeal Br. 11. Outer polymeric layer 4 may provide thermal insulation, but it is not a shape memory material, nor is it provided on an inner wall. *See* Ans. 16. Indeed, Biris disparages the use of inner plastic coatings. Biris ¶ 29.

Thus, we do not sustain the rejection of claims 1–4, 6, and 8.

Claims 5, 10, and 14 as unpatentable over Katayama, Biris, and Steiner

The Examiner relies on Biris to teach producing a hose from a shape memory material, introducing the hose into an oil gallery or supply line, and activating the shape memory material to form thermal insulation as recited in independent claim 10. Final Act. 6; Ans. 17. This finding is not supported by a preponderance of evidence for the reasons discussed above for claim 1. Biris does not disclose inner copper tube 1 being activated to form thermal insulation. Appeal Br. 19. The Examiner's finding that Steiner teaches an oil gallery with thermal insulation does not cure this deficiency in Biris. Final Act. 7. Thus, we do not sustain the rejection of claims 5, 10, and 14.

Claims 7 and 9 as unpatentable over Katayama, Biris, and Kato/Toda

The Examiner's findings that Kato or Toda teach features recited in claims 7 and 9 does not overcome the deficiencies of Biris as to claim 1, from which claims 7 and 9 depend. *See* Final Act. 7–9; Appeal Br. 20–21. Thus, we do not sustain the rejections of claims 7 and 9.

Claims 11–13 as unpatentable over Katayama, Biris, Steiner, and Rabhi/Burns and Weigelt

The Examiner's findings that Rabhi teaches features recited in claims 11 and 12, and Burns and Weigelt teach features recited in claim 13, do not overcome the deficiencies of Biris as to claim 10, from which claims 11–13 depend. *See* Final Act. 9–10; Appeal Br. 21. Thus, we do not sustain the rejections of claims 11–13.

Claims 16–18 and 21 as unpatentable over Katayama, Biris, Steiner, and Maynard

The Examiner relies on Biris to teach thermal insulation that lines an inner wall of the supply line and has a shape memory material that forms a shape lining the inner wall of the supply line, and Maynard to teach a shape memory material that is temperature-activated, as recited in independent claim 16. Final Act. 11. For the reasons discussed above for claim 1, Biris does not disclose thermal insulation having shape memory material to form a shape lining the inner wall of a supply line. Appeal Br. 22–23. Maynard's teaching of a temperature-activated shape memory material and Steiner's teaching of an oil gallery do not overcome this deficiency of Biris. Final Act. 11–12. Thus, we do not sustain the rejection of claims 16–18 and 21.

DECISION

We reverse the rejections of claims 1–14, 16–19, and 21.

REVERSED