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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte GREGORY GERALD HUGHES,
MICHAEL J. REINKE, and TONY ROUSSEAU

Appeal 2018-005984
Application 14/430,787
Technology Center 3700

Before PHILIP J. HOFFMANN, KEVIN W. CHERRY, and
ROBERT J. SILVERMAN, *Administrative Patent Judges*.

SILVERMAN, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision rejecting claims 1–20. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM-IN-PART.

¹ We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies Modine Manufacturing Company as the real party in interest. Appeal Br. 2.

ILLUSTRATIVE CLAIM

1. A heat exchanger to transfer heat between a first and a second fluid, comprising;

first and second flat headers, each with at least one opening and each arranged at opposing ends of the heat exchanger;

a first flow conduit fluidly connecting the first and second flat headers via the at least one opening of each of the headers to allow for a flow of the first fluid through the heat exchanger, the first flow conduit being bounded by a first wall section extending between the first and second headers;

a second flow conduit to allow for a flow of the second fluid through the heat exchanger, the second flow conduit being bounded by a second wall section spaced apart from the first wall section to define a gap therebetween; and

a thermally conductive structure arranged within the gap and joined to the first and second wall sections to transfer heat therebetween, wherein the thermally conductive structure is isolated from the first fluid by the first wall section and from the second fluid by the second wall section.

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Donaldson	US 4,002,201	Jan. 11, 1977
Higashiyama	US 8,002,024 B2	Aug. 23, 2011
Yoshino et al. ("Yoshino")	JP 2011-132570 A	July 7, 2011

REJECTIONS

I. Claims 1–7 are rejected under 35 U.S.C. § 112(a), as failing to comply with the written-description requirement.

II. Claims 1–6, 14–16, and 18–20 are rejected under 35 U.S.C. § 102(b) (pre-AIA) as anticipated by Donaldson.

III. Claims 7 and 17 are rejected under 35 U.S.C. § 103(a) (pre-AIA) as unpatentable over Donaldson and Yoshino.

IV. Claims 8–13 are rejected under 35 U.S.C. § 103(a) (pre-AIA) as unpatentable over Donaldson and Higashiyama.

FINDINGS OF FACT

The findings of fact relied upon, which are supported by a preponderance of the evidence, appear in the following Analysis.

ANALYSIS

Written Description

According to the Examiner, the “flat headers” limitation of independent claim 1 lacks written description support in the Specification, because the Specification discloses only “headers *formed from flat sheet steel and not the headers themselves are flat.*” Final Action 2 (emphasis added). The Examiner further points out that “Fig. 3A shows the header 9 is curved.” *Id.*

The Appellant contends that what the Examiner asserts to be a “curved” header is actually a different structure (“manifold 4”). Appeal Br. 6.

Figures 2 and 3A of the Specification display some curvature on the sides of “header 9.” Figure 2 is reproduced below, with the addition of blue shading to identify “header 9”:

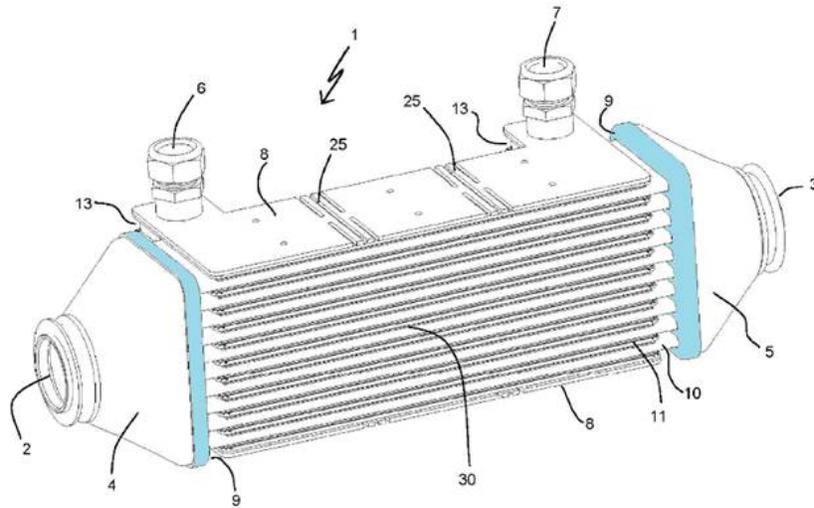


Fig. 2

Figure 2 of the Appellant's Specification shows a perspective view of a heat exchanger. Spec. ¶ 17. Figure 3A of the Specification is reproduced below, with the addition of blue shading to identify "header 9":

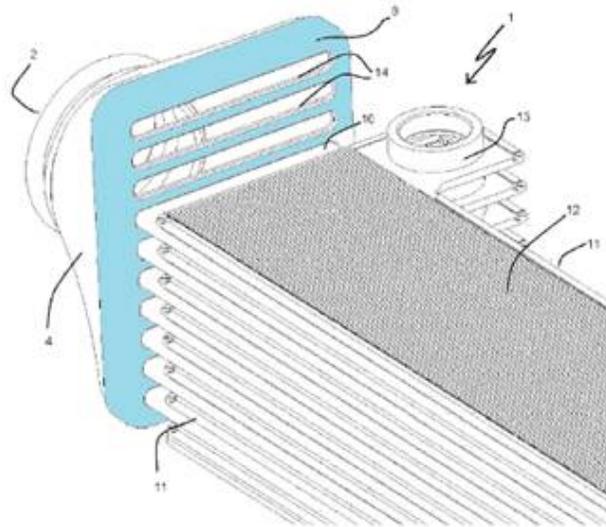


Fig. 3A

Figure 3A shows a perspective view of a heat exchanger. *Id.* ¶ 18. Notwithstanding the curvature on the sides of the Figures 2 and 3A, Figure 3A, in particular, also indicates that "header 9" has a broad, generally planar surface having "tube slots 14." *Id.* ¶ 34, Fig. 3A (elements 9, 14).

Furthermore, the presence of such displayed curvature does not undermine the characterization of “header 9” as being “flat,” per claim 1. Notably, the Specification describes “tube 10” as having “flat walls 16” (*id.* ¶ 26), notwithstanding the presence of curved sides, as seen in Figure 6, reproduced below:

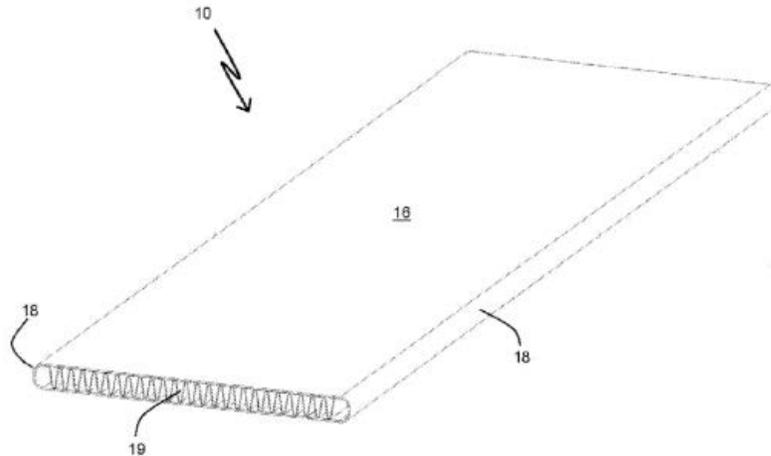


FIG. 6

Figure 6 is a perspective view of a tube for use in a disclosed heat exchanger. *Id.* ¶ 21. According to the Specification:

An example of a single tube 10 as used in the exemplary heat exchanger 1 is depicted in FIG. 6. As shown therein, the tube 10 includes a pair of opposing broad and planar walls 16, spaced apart and joined by a pair of short walls 18. The short walls 18 are depicted as arcuate in profile, although in some other embodiments the short walls can have a straight or other non-arcuate profile. The tube 10 can be formed as a single piece from sheet steel, such as by seam welding a round tube from sheet steel and then flattening the tube to produce the pair of broad and flat walls 16 and the pair of short walls 18.

Id. ¶ 26.

In view of the foregoing, we are persuaded of error in the rejection of independent claim 1, such that we do not sustain the rejection of claims 1–7 under 35 U.S.C. § 112(a).

Anticipation

A. Independent Claim 1 and Dependent Claims 3–7

The Appellant contends that the Examiner erred in rejecting independent claim 1, because the cited Donaldson reference does not disclose the claimed “flat headers.” Appeal Br. 9. According to the Appellant:

The areas of the upper and lower end chamber housings 12 are what create the inlet and outlet fluid manifolds, respectively. One of ordinary skill in the art would understand Donaldson simply does not include or otherwise disclose a pair of flat headers. One of ordinary skill in the art understands that headers are not simply walls. Rather, headers separate different fluids, which create fluid flow paths.

Id.

The identified element 12 of Donaldson is shown in, in Figure 4 thereof, which is reproduced below, with element 12 shaded lavender:

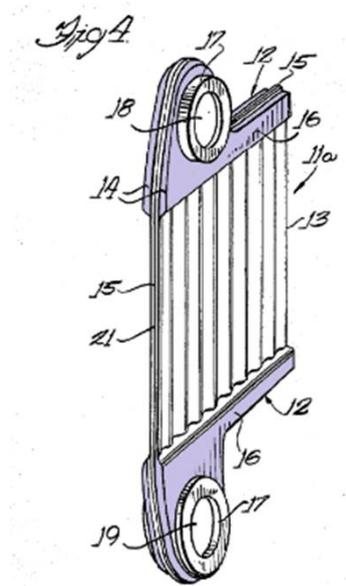


Figure 4 is a perspective view of several assembled components of a heat exchanger. Donaldson col. 2, ll. 22–23. Element 12 is described in the Donaldson reference as “upper and lower end chamber housings or headers 12, 12 connected by a heat transfer core portion 13 which has a suitable fluid dispersing configuration.” *Id.* col. 2, ll. 45–48 (emphasis added).

As the Examiner explains (Answer 4–5) the identified elements of Donaldson are not only named “headers” in the reference itself, but they perform the same header function as the claimed “headers.” Although the Appellant does not specifically contend that the Donaldson elements are not “flat,” Donaldson’s “headers” possess broad outer surfaces that are fairly called “flat.”

Accordingly, we sustain the rejection of independent claim 1 and dependent claims 3–7 (which are not argued separately) under 35 U.S.C. § 102(b) (pre-AIA).

B. Dependent Claim 2

The Appellant advances a separate argument for dependent claim 2, which recites:

2. The heat exchanger of claim 1, wherein the second flow conduit is spaced away in a first flow conduit axial direction from at least one of the first and second headers, the second flow conduit being defined by a flow path for the second fluid.

The Examiner regards each of the “first flow conduit” and the “second flow conduit” (limitations recited in base claim 1) as being met by one of Donaldson’s “heat transfer core portion[s] 13” that connect respective “upper and lower end chamber housings or headers 12” identified in

Donaldson at column 2, lines 45–47. *See* Final Action 5, 6 (citing Donaldson col. 2).

Donaldson’s device employs an array of the Fig. 4 assemblages (discussed above), arranged in opposing orientations, as shown in Donaldson’s Fig. 1, below:

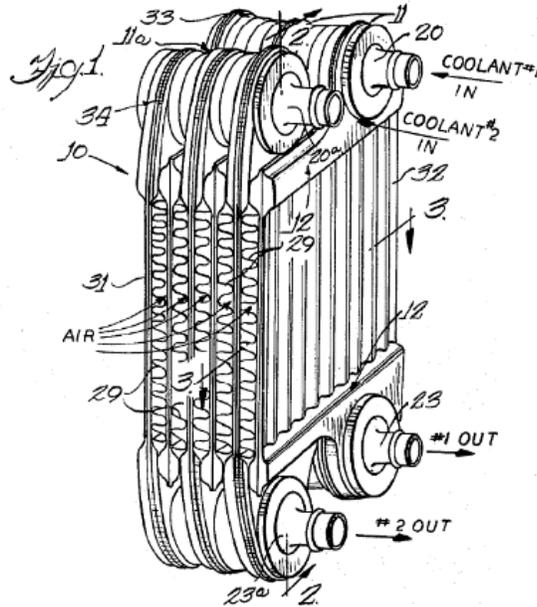


Figure 1 is a perspective view of a heat exchanger. Donaldson col 2, ll. 16–17. As seen in Figure 1 of Donaldson, between opposing upper and lower “housings or headers 12,” the passages (teaching, e.g., either a claimed “first flow conduit” or a claimed “second flow conduit”) within “heat transfer core portion 13,” all connect fluidly with Donaldson’s “housings or headers 12” at the same upper and lower positions, assessed with respect to what claim 2 calls the “first flow conduit axial direction.” *See id.* col. 2, ll. 39–48.

According to the Examiner, Donaldson teaches that the claimed “second flow conduit” is “spaced away” from one of the “headers” (in a “first flow conduit axial direction”). Final Action 7. *See also* Answer 5–7. According to the Examiner:

The current claim does not recite the second flow conduit is spaced away from an entire header, rather the claim merely recites the second flow conduit is spaced away from the header and can reasonably be interpreted to mean spaced away from a portion of the header.

Answer 6 (emphasis added).

Yet, as the Appellant argues (*see* Appeal Br. 9), the Examiner’s above-quoted interpretation on page 6 of the Answer (to the effect that “the second flow conduit is spaced away from the header and can reasonably be interpreted to mean spaced away from a portion of the header”) is not consistent with the Specification. The Specification refers to such a “spaced” arrangement of “flow paths for the second fluid” involving a “flow path[]” that resides “a distance 15 away from the header 9” (Spec. ¶ 46, Fig. 5). The Specification explains:

This minimizes the thermal gradient between the header 9 (which is exposed only to the first fluid in the manifold 4 or 5) and the tube wall 16 in the heat transfer region, and provides a length of the tube 10 wherein the differential thermal expansion between, on the one hand, the header 9 and the ends of the tubes 10, and on the other hand, the joined tubes 10 and plate assemblies 11, can be compensated for without imposing severe mechanical stresses on the tubes 10.

Id. ¶ 46. These features would not be achieved if only portions of the elements identified were “spaced” from each other (the Examiner’s position). Thus, as used in the Specification, the term “spaced” (in the context of the elements at issue, here) involves a physical separation between respective elements, in their entireties — not merely portions thereof.

In view of the foregoing analysis, we do not sustain the rejection of claim 2 under 35 U.S.C. § 102(b) (pre-AIA).

*C. Independent Claim 14 and
Dependent Claims 15, 16, and 18–20*

Independent claim 14 also stands rejected as anticipated by Donaldson. Claim 14 recites:

14. A heat exchanger to transfer heat between a first and second fluid, comprising:

a first plurality of flow conduits to transport the first fluid through the heat exchanger;

a second plurality of flow conduits interleaved with the first plurality of flow conduits to transport the second fluid through the heat exchanger; and

intermediate structures arranged in *gaps* between adjacent ones of the first and second pluralities of flow conduits to provide thermal and structural connections therebetween, the intermediate structures each including at least one sacrificial fatigue location,

wherein *adjacent ones of the first and second pluralities of flow conduits are entirely separated by the gaps.*

Emphasis added.

Asserting error in the rejection of claim 14, the Appellant argues:

The Examiner contends the plates 11, 11a provide the first and second pluralities of flow conduits, respectively. Donaldson clearly does not provide a gap between the entirety of the “first and second flow conduits”, as required by claim 14, at least because the plates 11, 11a are connected to each other.

Appeal Br. 12.

In response, the Examiner states that the Appellant’s representation of the analysis provided in the rejection, is mistaken:

In the interpretation taken by the Office, only the corrugated portion indicated in Fig. A [corresponding to Donaldson Fig. 4] above has been taken as the flow conduits (see also Fig. B of Final rejection [corresponding to Donaldson’s Fig. 2]). The

first and second flow conduits, as interpreted by the Office, are entirely separated by the gaps (surrounding fins shown in Fig. 2) and anticipate claim 14.

Answer 7.

Donaldson states that the “stacked plate heat exchanger 10 formed of a plurality of identical plate sections 11, 11a.” Donaldson, col. 2, l. 43. In addition, “[e]ach plate section 11 or 11a is formed from a pair of oppositely disposed dished blanks 14, 14 of mirrored symmetry which are joined along their peripheral edges 15 to form a hollow fluid conduit.” *Id.*, col. 2, ll. 49–52. With mirrored plate sections connected to each other, “a plurality of tubes 25 . . . are formed by the opposing corrugations” of the plate sections and core portions 13. *Id.* at col. 3, ll. 3–6. Between these sets of paired plates, “fins 29” are disposed, “preferably run at right angles to the core corrugations so as to provide straight through air passages from one vertical edge 31 of the assembly to the opposite edge 32.” between “core portions 13.” *Id.* at col. 3, ll. 15–22 (emphasis added). The “air passages” are seen in Donaldson’s Fig. 1, which is reproduced above.

In view of the formation of such “straight through air passages,” thus adequately disclosing the recited “gap” of claim 14, we are not persuaded of error in the rejection.

Accordingly, we sustain the rejection of independent claim 14 and dependent claims 15, 16, and 18–20, which are not argued separately, under 35 U.S.C. § 102(b) (pre-AIA).

Obviousness

A. Dependent Claims 7 and 17

With regard to the obviousness rejections of dependent claims 7 and 17, the Appellant relies upon the arguments advanced, in regard to the

anticipation rejection of respective base claims 1 and 14. *See* Appeal Br. 12. Accordingly, we sustain the rejection of claims 7 and 17 under 35 U.S.C. § 103(a) (pre-AIA).

B. Independent Claim 8 and Dependent Claims 10–13 and 17

Independent claim 8 recites:

8. A heat exchanger comprising:

first and second headers arranged at opposing ends of the heat exchanger;

a plurality of flat tubes extending between the first and second headers, a first end of each one of the plurality of flat tubes extending through one of a plurality of corresponding tube slots provided in the first header, a second end of each one of the plurality of flat tubes extending through one of a plurality of corresponding tube slots provided in the second header;

a plurality of plate assemblies arranged between the first and second opposing headers, the plurality of plate assemblies being interleaved with the plurality of flat tubes; and

a plurality of thermally conductive structures arranged in gaps defined between adjacent ones of the flat tubes and plate assemblies, each one of the plurality of thermally conductive structures joining opposing external surfaces of the flat tubes and plate assemblies to transfer heat therebetween.

The Appellant argues that, in rejecting independent claim 8, the Examiner improperly combines the Donaldson and Higashiyama references:

[T]he Examiner is drastically changing the functionality of Donaldson, and likely making assembly and overall construction of the heat exchanger more difficult and less secure. The alternating plates 11, 11a of Donaldson have complimentary shapes to fit around one another to make space for the manifolds and so to be easily joined together. Forcing the header design 5, 6 of Higashiyama into the plates 11, 11a of Donaldson would be difficult as the geometry of the plates would need to be substantially changed to now have a

protruding tube part that must be somehow closed along a seam that would be sealable within a tube slot. Further, assembly of such tube/plate hybrid conduits with fins and other tubes and the headers themselves would not be an easy task, certainly not as easy as stacking the plates of Donaldson. A separate header design is much easier for Higashiyama as it has elongated, symmetrical tubes that have been simply extruded or welded to make a flush seam for an easy and sealable insertion into a tube slot of a header.

Appeal Br. 14.

Yet, the Appellant provides no support for these assertions of altered functionality and difficulty of construction. Moreover, as the Examiner points out, the Appellant's contemplated bodily incorporation of one reference into another is not the standard for obviousness. Answer 8. "The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference"; "[r]ather, the test is what the combined teaching of those references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425 (CCPA 1981).

In view of these principles, and the foregoing analysis, we are not persuaded of error in the rejection of claim 8, such that we sustain the rejection of independent claim 8 and dependent claims 10–13 and 17, which are not argued separately, under 35 U.S.C. § 103(a) (pre-AIA).

C. Dependent Claim 9

The Appellant separately argues the rejection of claim 9, which recites:

9. The heat exchanger of claim 8, wherein the plurality of plate assemblies is *spaced away* from at least one of the first and second opposing headers.

Emphasis added.

The Appellant argues that claim 9 is “allowable for similar reasons stated above regarding claim 2.” Appeal Br. 14.

The Examiner likewise states: “Claim 9 is unpatentable for similar reasons stated above regarding claim 2.” Answer 9.

The reasoning provided, above, analyzing the “spaced away” limitation of claim 2, applies equally to the “spaced away” limitation of claim 9 here, because the Examiner relies upon the same elements of Donaldson to teach the limitations at issue. As in the case of claim 2, the Appellant’s argument persuades us of error in the rejection of claim 9. Accordingly, we do not sustain the rejection of claim 9 under 35 U.S.C. § 103(a) (pre-AIA).

CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–7	112(a)	Written description		1–7
1–6, 14–16, 18–20	102(b) (pre-AIA)	Donaldson	1, 3–6, 14–16, 18–20	2
7, 17	103(a) (pre-AIA)	Donaldson, Yoshino	7, 17	
8–13	103(a) (pre-AIA)	Donaldson, Higashiyama	8, 10–13	9
Overall Outcome			1, 3–8, 10–20	2, 9

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TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED-IN-PART