

COMMISSIONER'S DECISION

CLAIMS INDEFINITE: Essential Characteristic Not Stated.

Some claims failed to state the relationship of the components of the absorption refrigeration apparatus essential to resolve the problem that constitutes the alleged advance in the art. Other claims were deemed allowable.

FINAL ACTION: Affirmed in-part.

This decision deals with a request for review by the Commissioner of Patents of the Examiner's Final Action dated September 22, 1972 on application 078,614. This application was filed on March 31, 1970 in the names of Jack D. Meess, John C. Kastovich and Robert S. Lackey, and refers to an "Absorption Refrigeration System".

In the prosecution terminated by the Final Action the examiner rejected claims 1, 2, 11 to 14 and 22 to 24 for failing to define any invention over the prior art. Claims 15 to 19 were rejected on the basis that they do not depart from the conventional refrigeration circuits as discussed in the disclosure of this application.

The examiner cited the following prior art:

United States Patents:			
2,243,903	June 3, 1941	Cl. 62-119.5	Hintze
2,979,310	Apr. 11, 1961	Cl. 257-247	Nicholson
2,974,498	Mar. 14, 1961	Cl. 62-156	Ehrenfreund
2,900,807	Aug. 25, 1959	Cl. 62-277	Solley Jr.

This application refers to an absorption refrigeration system formed in substantially its entirety from at least two superimposed sheets bonded together at their interfaces, except for the portions defining operating components and interconnecting passages. These passages are in outwardly expanded or embossed form. Claims 1 and 15 which are representative of the sets of rejected claims read:

1. In an inert gas type, absorption refrigeration apparatus, a tube-in-sheet panel containing a working fluid to which a source of heat is adapted to be applied to effect operation of said apparatus, said panel comprising the entirety of the apparatus in the sense of providing a complete flow system

including refrigeration contributing components and inter-connecting fluid passages, save for said source of heat, said panel being constructed and arranged that as formed all said components and all said passages lie in the general plane of said panel.

15. A tube-in-sheet panel containing a working fluid, the panel constituting the entirety of the flow system of an absorption refrigeration system save for a source of heat to effect operation of said system, the panel being of generally rectangular outline and adapted to occupy a sufficiently upright plane during operation to accommodate the requisite gravity flow in the system, all of the refrigeration contributing components and connecting passages being in communication internally of said panel, said panel including one area thereof having, in descending order, a condenser, evaporator, gas heat exchanger, absorber, receiver, and liquid heat exchanger, said panel further including another area on the general level of said absorber and reservoir and to the side thereof having a boiler and lift section, said components and passages including; and inert gas feed passage extending from the upper portion of the absorber to the inlet of said evaporator, and evaporator exit passage connecting the outlet of said evaporator with the lower portion of said absorber, said inert gas feed passage and said evaporator exit passage extending in counterflow, adjacent heat exchange relation for a portion of their length to form said gas heat exchanger section, a rich liquid passage extending from the lower portion of said reservoir to the lower portion of said boiler and lift section, a weak liquid extending from the lower portion of said boiler and lift section to the upper portion of said absorber, said rich liquid passage and said weak liquid passage extending in counterflow, adjacent heat exchange relation for a portion of their length to form said liquid heat exchanger, all of said components and passages lying in the general plane of said panel as formed.

In the Final Action the examiner stated in part:

Hintze teaches the formation of an absorption refrigeration apparatus in which vessels and conduits are formed of indented and corrugated metal sheets arranged in pairs and hermetically sealed.

...

The rejection of claims 1, 2, 11-14 and 22-24 is maintained and the reasons for such rejection are that these claims fail to define any inventive, clearly defined unobvious step over Hintze in view of common knowledge evidenced by the other references and expected skill.

...

Claims 1, 2, 13, 14 and 22-24 in setting forth that the entirety of the apparatus is formed, save for the heat source, between facing sheets forming a tube-in-sheet panel are held to be merely restating the problem to be overcome in terms

of a desired result rather than setting forth those elements of structure which clearly show how the problem is overcome. Roll bonded units are generally common knowledge (See Ehrenfreund and Solley Jr.) and to incorporate them into an absorption unit is held to be but expected skill.

Nicholson shows the features brought out by claims 11 and 12. To incorporate such features into a roll bonded arrangement is held to be obvious and thus does not offer an inventive step over Hintze in view of common knowledge. Nicholson, as noted above shows the features of a three element construction with an opening in the intermediate sheet interconnecting passages on either side thereof.

...

Upon further examination it is found that claims 15, 16, 17, 18 and 19 are not patentable and therefore these claims also stand rejected.

...

They are presently held rejected since they do not depart from the conventional refrigerator circuits as noted by applicant at page 8 lines 23-25 and page 9 line 28-page 10, line 11. The only departure is in the formation of a tube-in-sheet panel, and as noted in the rejection of claim 1 such a distinction is not a patentable one. Further, considering claim 17, Hintze shows cut outs similar to those of claim 17 at A, B, C and D.

The applicant, in two separate responses both dated December 19, stated in part:

In regard to the first set of claims:

The applicant fully realizes that roll bonded sheets are not new. In the specification, on page 1, it is stated:

"It is well known to make heat exchange units from metal sheets processed and bonded in facing relation with a pattern of passages (typically inflated) provided between the sheets. The use of a panel of this general character in an absorption refrigeration system has also been suggested in the patent art as evidenced by U.S. patent 2,243,903."

...

"That patent (2,243,903) deals with a tube-in-sheet type of absorption refrigeration apparatus which purports to comprise a complete absorption refrigerating apparatus in which the entire system is formed by the depressions of the metal sheets arranged face to face together. It is said that in that manner all or the majority of the vessels may be made of very few metal sheets. The result according to the patent is especially favorable for the

mass production of absorption refrigerating apparatus. However, the arrangement according to that patent is deficient, as contrasted to the present invention, in requiring certain auxiliary parts such as a pump and certain connecting conduits which must be separately manufactured and connected with the vessels and passageways formed of the metal sheets."

...

The applicants invention is not obvious from Hintze. Hintze discloses the desirability of reducing the number of parts required to produce an absorption refrigeration apparatus. Hintze certainly has not disclosed a complete system formed entirely in the tube-in-sheet panel. He has merely reduced the number of parts required to produce an absorption refrigeration apparatus by including some of the elements in a tube-in-sheet panel and then connecting the remaining elements required to produce a functioning system. The elements, such as the pump 50 and the connecting tube 13 and other crossovers shown in Fig. 1 of the cited reference must all be welded to the tube-in-sheet panel before the refrigeration apparatus of Hintze will function.

In regard to the second set of claims:

In the apparatus of Hintze the components require a three dimensional spacial arrangement, whereas the applicants apparatus requires only a two dimensional spacial arrangement as formed.

By this the applicant means that Hintze has not solved the problem of how to reduce the conventional flow patterns of an absorption refrigeration system from a three dimensional representation as occurs when the system is built up using discrete components which may include some portions fabricated in a tube-in-sheet panel and allows for crossovers in connecting tubes and allows the components to be placed in the most advantageous position with respect to one another and to be connected by the connecting tubes, to a planar or two dimensional representation in which all of the elements are formed in the sheet and therefore lie in one plane as formed. Because Hintze did not solve the problem of reducing the conventional flow patterns from a three dimensional form to a two dimensional form and because he did not solve the problem of providing a tube-in-sheet panel which would have adequate circulation without the use of external pumping means, Hintze was forced to use additional connecting tubes and crossovers as well as the pump 50, all of which had to be welded to the tube-in-sheet panel.

The first question to be decided is whether claims 1, 2, 11 to 14 and 22 to 24 are patentable over the cited references.

The Hintze reference discloses an absorption refrigeration apparatus which includes a tube-in-sheet panel containing a working fluid, to

which a source of heat is adapted to operate the apparatus. Claim 2 of this reference reads:

An absorption refrigerating apparatus of the continuous type comprising a single pair of metal sheets sealed face to face together and having indentations and corrugations forming a generator vessel, a gas separator vessel, condenser, an absorber, an evaporator, and interconnecting conduits arranged so as to form a circulation system, part of said conduits being arranged in heat-exchanging relationship with one another.

The Nicholson reference shows a three sheet heat exchanger with openings in the inner sheet, and connecting passages on either side thereof, while the references to Ehrenfreund and Solly each show roll-bonded heat exchanger units.

Claim 1 defines the following structure:

- (a) in an inert gas type, absorption refrigeration apparatus;
- (b) a tube-in-sheet panel containing a working fluid and a source of heat for the operation of said apparatus;
- (c) said panel comprising the entirety of the apparatus in the sense of providing a complete flow system including refrigeration contributing components, some for said source of heat, and interconnecting fluid passages; and
- (d) said panel being constructed and arranged that as formed all said components and all said passages lie in the general plane of said panel.

While it is conceded that the applicant does not require a pump for the operation of his system as does Hintze, the basic difference from the Hintze reference is that conduits 13, 19 and 51 interconnects the passages externally while all the passages are included in the panel of the present application. It is known, however, to form passages using a tube-in-sheet panel. Any extension therefore to include all the passages in a panel, is only an obvious modification from what is already common general knowledge.

On page 1 of the disclosure the applicant states that: "The main problem arising in providing a tube-in-sheet absorption refrigeration

system which is embodied in its entirety, insofar as its internal components and passages are concerned, in a planar panel as formed, is that the system design must be developed from what is essentially a two dimensional schematic pattern of the absorption refrigeration cycle. In other words, the physical location and relationships of the various basic components of the absorption apparatus (condenser, evaporator, absorber and boiler) are located as though the system represented a flow diagram with gravity feed characteristics."

Claim 1 does not define the essential physical location and relationship of the various basic components of the absorption apparatus (condenser, evaporator, absorber and boiler) which according to the applicant, is the main problem to be solved for the system represented by a flow diagram with gravity feed characteristics. A claim may not distinguish from the Hintze reference and common general knowledge and practice merely by indicating the desired result, or simply restating the problem. The claim, to be patentable, must define a mode of application essential to the operation and use of a new principle or idea. We are satisfied that claim 1 does not properly define the alleged advance in the art.

Claim 2, which depends on claim 1, states that the tube-in-sheet panel consists of two initially separate sheets bonded together during formation of said panel. The structure of Hintze, Ehrenfreund and Solly are all formed in the manner recited in claim 2.

Claim 11, which is dependent on claim 1, states that the tube-in-sheet panel consists of three separate sheets, and that the opposite outer sheets each include outwardly-bulging portions forming said components and passages. It further states that the intermediate sheet includes selectively located openings to place

selected components and passages on opposite sides of said intermediate sheet in communication. This particular type of structure is specifically shown by numerals 11, 12, 13, 14, 44, 45 and 46 in figure 4 of the Nicholson reference.

Claim 12, which is dependent on claim 11, states that an apparatus which includes a gas heat exchanger and a liquid heat exchanger is incorporated into the panel, and that at least one of said heat exchangers is formed of passages which are located substantially directly opposite each other on opposite sides of the intermediate sheet. The gas heat exchanger and the liquid heat exchanger are shown in the Hintze reference, whereas figure 4 of the Solly reference shows the arrangement of the two conduits on opposite sides of an intermediate sheet.

Claims 13 and 14 are directed to substantially the same subject matter as claimed in claim 1, except that the components and passages are formed of outwardly-bulging embossments in at least one of said sheets. The references to Hintze and Nicholson describe structure of this type.

It is noted that dependent claims 22, 23 and 24 add an external heat transfer promoting means. The Hintze reference, however, provides this arrangement at 1 in figure 1.

In summation, we are satisfied that claims 1, 2, 11 to 14 and 22 to 24, as presented, fail to define the alleged advance in the art for the reasons stated, and for relating to what constitutes a conventional refrigeration system.

The second question to be decided is whether claims 15 to 19 are patentable over and above the applicant's own description of what constitutes a conventional refrigeration circuit.

In the Final Action the examiner referred to the following statements found in the applicant's disclosure:

On page 8 beginning at line 23,

These circulating paths for the components of the solution are conventional for any ammonia absorption system utilizing an inert gas.

And on page 9 beginning at line 28,

As has been noted, the circulation patterns and the general operational mode of the panel system according to the invention corresponds to that of the conventional inert gas type systems.

The disclosure of this application reads in part:

On page 1 beginning at line 13,

It is well known to make heat exchange units from metal sheets processed and bonded in facing relation with a pattern of passages (typically inflated) provided between the sheets. The use of a panel of this general character in an absorption refrigeration system has also been suggested in the patent art as evidenced by U.S. patent 2,243,903. That patent deals with a tube-in-sheet type of absorption refrigeration apparatus which purports to comprise a complete absorption refrigerating apparatus in which the entire system is formed by the depressions of the metal sheets arranged face to face together. It is said that in that manner all or the majority of the vessels may be made of very few metal sheets. The result according to the patent is especially favorable for the mass production of absorption refrigerating apparatus. However, the arrangement according to that patent is deficient, as contrasted to the present invention, in requiring certain auxiliary parts such as a pump and certain connecting conduits which must be separately manufactured and connected with the vessels and passageways formed of the metal sheets.

On page 2 beginning at line 21,

... In other words, the physical location and relationships of the various basic components of the absorption apparatus (condenser, evaporator, absorber and boiler) are located as though the system represented a flow diagram with gravity feed characteristics.

And on page 9 beginning at line 31,

However, the provision of the system as a whole in generally planar form for fabrication purposes, the omission of operating components (such as pumps) connected to the internals of the system, the size limitation imposed by present fabrication techniques for tube-in-sheet panels, and the requirements of obtaining reasonably satisfactory performance of the system, pose substantial problems in the design of the system as a whole.

In accordance with the above statements it is established that the applicant was familiar with conventional absorption refrigeration systems. He was also familiar with the teachings of United States patent 2,243,903, the Hintze reference, which has been relied on extensively to reject claims. These statements also suggest improvements to existing prior art refrigeration systems.

Claim 15 defines the physical location and relationships of the various basic components, and introduces the following limitations:

- (a) the panel is adapted to occupy a sufficiently upright plane during operation to accommodate the requisite gravity flow in the system;
- (b) the panel includes one area having in descending order, a condenser, an evaporator, a gas heat exchanger, an absorber, a receiver, a liquid heat exchanger, a boiler and a lift section located in an area to the side of the absorber and receiver;
- (c) the panel includes an inert gas feed passage extending from the upper portion of the absorber to the inlet of the evaporator, an evaporator exit passage connecting the outlet of the evaporator with the lower portion of the absorber, the passages extending in counterflow heat exchange relationship, and
- (d) the panel also includes a rich liquid passage extending from the lower portion of the reservoir to the lower portion of the boiler, a weak liquid passage extending from the lower portion of the boiler to the upper portion of the absorber, the passage extending in counterflow heat exchange relationship.

In our view the subject matter of claim 15 distinguishes from the description given in the disclosure of what constitutes a conventional refrigeration system. Claims 16 to 19 also avoid the objection made in the Final Action, since they are dependent on claim 15.

The examiner also pointed out that the cancellation of the rejected claims would raise an objection under Section 60 of the Patent Rules and Section 38 of the Patent Act. In the opinion of the Board, however, an amendment to claims 1, 13 and 14 would overcome all objections, if such amendment properly defined the essential physical location and relationship of the various components of the absorption apparatus, for example, as defined in claim 15.

In summary, the Board is satisfied that claims 1, 2, 11 to 14 and 22 to 24, as presently presented, do not define the alleged advance in the art over the cited references and common practice, but that claims 15 to 19 are acceptable over the state of the art as disclosed in the specification.

The Board recommends therefore that the refusal of claims 1, 2, 11 to 14 and 22 to 24 be affirmed, and that claims 15 to 19 be accepted.



J.F. Hughes,
Assistant Chairman,
Patent Appeal Board.

I concur with the findings of the Patent Appeal Board. Accordingly I refuse to grant a patent which includes claims 1, 2, 11 to 14 and 22 to 24, but will accept claims 15 to 19. The applicant has six months to present an appropriate amendment deleting claims 1, 2, 11 to 14 and 22 to 24, or to appeal this decision under the provision of Section 44 of the Patent Act.

Decision accordingly,



A.M. Laidlaw,
Commissioner of Patents.

Dated in Hull, Quebec,
this 20th day of November, 1973.

Agent for Applicant

McConnel & Fox,
Hamilton, Ontario.