BLO / 189/83

IN THE MATTER OF an application
by Air Products and Chemicals Inc
under Section 15(4) to divide
application 8232183 out of
GB 2043608A

DECISION

The applicants having disagreed with the objection by the Examiner that in accordance with the provisions of Section 76(1) application 8232183 cannot be allowed to be filed under Section 15(4), a Hearing was requested.

At the Hearing before me on 13 April 1983, Mr A Drysdale-Wilson, instructed by Mr B Lucas of Lucas, George & Co, (Warlingham), appeared as Counsel for the Applicants and Mr M J Pennell, Senior Examiner, was present as examiner dealing with the application.

The Applicants earlier specification GB 2043608A relates to a cryogenic plant and method for manufacturing ammonia synthesis gas from a stream rich in hydrogen and a stream of nitrogen. The proposed divisional 8232183 relates to a vapour warming and mixing stage of the parent but has been the subject of an objection by the examiner under Section 76(1) in that it appears to be claimed more broadly than is justified by the disclosure of GB 2043608A.

The invention claimed in GB 2043608A is defined in claims 8 and 9 as:
A method of manufacturing ammonia synthesis gas from a stream of hydrogen rich gas and a stream of nitrogen which method comprises the steps of:

(a) cooling said stream of nitrogen and said stream rich in hydrogen in a first heat exchanger to a temperature which, when said nitrogen leaving said first heat exchanger is at or above its critical pressure, is between 8°C and 28°C above its critical temperature; or to a temperature which when said nitrogen leaving said first heat exchanger is below its critical pressure is between 3°C and 9°C above its dew point;

(b) introducing said stream rich in hydrogen leaving said first heat exchanger into the bottom of a second heat exchanger and cooling said stream rich in hydrogen as it passes upwardly through said second heat exchanger;

(c) introducing said stream in hydrogen leaving said second heat exchanger into the lower portion of a nitrogen wash column;

(d) cooling part of said stream of nitrogen leaving said first heat exchanger to below its critical temperature in a third heat exchanger arranged with its warm end uppermost;

(e) introducing said stream of nitrogen leaving said third heat exchanger into the top of said nitrogen wash column to act as reflux;

(f) dividing the vapour consisting essentially of hydrogen and nitrogen from the top of said nitrogen wash column into two streams;

(g) passing one of said streams through said second heat exchanger in countercurrent flow to said stream rich in hydrogen;

(h) passing the other of said streams through said third heat exchanger in countercurrent flow to said stream of nitrogen;

(i) combining said one and said other streams leaving said second and third heat exchangers respectively and the balance of said stream of nitrogen leaving said first heat exchanger to form ammonia synthesis gas;

(j) passing said ammonia synthesis gas through said first heat exchanger in countercurrent flow to said stream rich in hydrogen and said stream of nitrogen;

(k) expanding liquid (containing impurities washed out of said stream rich in hydrogen and nitrogen) leaving the bottom of said nitrogen wash column and passing the two phase mixture thus forward (formed) through said second heat exchanger wherein it vaporises in countercurrent flow to said stream rich in hydrogen and passing said vapour through said first heat exchanger in countercurrent flow to said stream rich in hydrogen and said stream of nitrogen.

There are corresponding claims 1 and 6 to apparatuses. The invention is exemplified with reference to Figure 2 wherein first heat exchanger 102, which is preferably arranged with its cold end uppermost, is used to cool the stream of nitrogen to a temperature which:

(a) if the nitrogen is above its critical pressure is between 8 and 28°C above its critical temperature; or

(b) if the nitrogen is below its critical pressure is between 3 and 9°C above its dew point.

Part of the nitrogen leaving the first heat exchanger 102 is passed downwardly through a third heat exchanger 204 where it is further cooled before being introduced into a nitrogen wash column 104 where it acts as reflux. The third heat exchanger is cooled by vapour leaving the top of the nitrogen wash column. After being cooled in the first heat exchanger the stream rich in hydrogen is passed upwardly in a second heat exchanger 202 where it is further cooled before being introduced into the lower portion of the nitrogen wash column.

Vapour consisting essentially of hydrogen and nitrogen from the top of said nitrogen wash column is divided into two streams and one of said streams is conveyed (110,206) through said second heat exchanger 202 in countercurrent flow to said stream rich in hydrogen, and the other of said streams is conveyed (110,205) through said third heat exchanger 204 in countercurrent flow to said stream of nitrogen. The two streams leaving said second and third heat exchangers are combined at point 207 and mixed with the balance of said nitrogen leaving said first heat exchanger via valve 109, to form ammonia synthesis gas which is conveyed through said first heat exchanger 102 in countercurrent flow to said stream rich in hydrogen and said stream of nitrogen. The liquid leaving the bottom of said nitrogen wash column 104 and containing impurities washed out of said stream rich in hydrogen together with some nitrogen, is expanded at valve 115 and passes first through the second heat exchanger 202 wherein it vaporises in countercurrent flow to said stream rich in hydrogen, and then through said first heat exchanger 102.

The invention claimed in the single claim of the proposed divisional 8232183 is for:

> A method for manufacturing ammonia synthesis gas from a stream rich in hydrogen and a stream of nitrogen, which method comprises the steps of cooling said stream rich in hydrogen and said stream of nitrogen, introducing said stream rich in hydrogen into the lower portion of a nitrogen wash column, introducing part of said nitrogen into the top of said nitrogen wash column as reflux, extracting vapour rich in hydrogen and containing nitrogen from the top of said nitrogen wash column and mixing said vapour with cold nitrogen to produce ammonia synthesis gas, characterised in that said vapour from the top of said nitrogen wash column is warmed before being mixed with cold nitrogen so that when said vapour is mixed with said cold nitrogen the resulting mixture remains in the vapour phase. The invention claimed apparently is based on that part of Figure 2 wherein

vapour from the nitrogen wash column 104 which passes through line 110 and then partly through line 205 and heat exchanger 204 and partly through line 206 and heat exchanger 202 for recombination at 207, is warmed so that when mixed with cold nitrogen via valve 109 the resulting mixture remains in the vapour phase.

This last feature was not specified as such in the method claims or description in GB 2043608A.

In accordance with Section 76(1) the Examiner in an Official letter of 6 January 1983 objected to added matter in the application the added matter comprising:-

(i) general references to cooling and warming the gas streams as compared to specific references to use of heat exchangers for said purpose in GB 2043608A,

(ii) reference to warming the vapour from the top of the nitrogen wash column before being mixed with cold nitrogen, the resulting mixture remaining in the vapour phase, and

(iii) the absence (omission) from the claim of 8232183 of the feature concerning recycling of the impurity stream from the bottom of the wash column through the second and first heat exchangers. The Examiner being of the opinion that the said references and said omission resulted in a broadening of the claim which contravenes the provisions of Section 76(1).

At the hearing Mr Drysdale-Wilson stated that in order to answer the Examiner's objection he would have to satisfy me that the matter in the proposed divisional did not disclose matter which extended beyond matter disclosed in the parent, the relevant part of Section 76(1) being: "An application for a patent ... shall not be allowed to be filed under Section .... 15(4) above" - - that being the relevant section for this application in terms of filing date - - "in respect of any matter disclosed in an earlier application or the specification of a patent which has been granted, if the later application discloses matter which extends beyond that disclosed in the earlier application, as filed, or the application for the patent, as filed".

For completeness, reference was made to Section 130(3) which reads: "For the purposes of this Act matter shall be taken to have been disclosed in any relevant application within the meaning of Section 5 above or in specification of

a patent if it was either claimed or disclosed otherwise than by way of disclaimer or acknowledgement of prior art in that application or specification.

Mr Drysdale-Wilson pointed out that the prior art for manufacturing ammonia synthesis gas as described in GB 2043608A had a control problem (see page 1, lines 38-56) in that the gaseous nitrogen flow through the heat exchanger 2 (Figure 1) was liable to disturbance. The methods and apparatuses of GB 2043608A were the means of solving this problem, and here I note they have resulted in complex method claims comprising 11 steps involving critical temperatures, heat exchangers, refluxing, countercurrent flow of gas streams in the heat exchangers and the removal of impurities. The apparatuses claimed are correspondingly complex. Another problem of the prior art is that the two phase mixture formed when the gaseous nitrogen and the washed gaseous hydrogen are mixed, has to be warmed in heat exchanger 2 (Figure 1). Apparently it is a well known phenomenon that when one mixes these two gases one gets a temperature drop which can take the mixture across the change of phase. Accordingly, in the prior art, in order to avoid a two phase mixture going into the top of the heat exchanger 2 and the resultant problems produced thereby, the mixture passes into the heat exchanger via a two phase separator and distributor - not shown (see page 1, lines 29-30 of GB 2043608A). However, Mr Drysdale-Wilson pointed out that in GB 2043608A and in the present application, the description given with reference to the embodiment of Figure 2 discloses (see page 4, lines 13 to 18 and 29 to 32 of GB 2043608A) that the use of such a two phase separator is avoided by splitting the vapour from wash column 104 into two streams which are warmed in heat exchangers 202 and 204 before being recombined at 207 and subsequently mixed with nitrogen from valve 109. The invention of the present divisional application relates to this warming of vapour from the top of the nitrogen wash column before it is mixed with cold nitrogen, the resulting mixture remaining in the vapour phase. The specification has a single claim as set out earlier herein.
Mr Drysdale-Wilson submitted that the application did not therefore disclose any more than what was disclosed in GB 2043608A, the descriptions being identical and the parent "talking about the claim which has been put in". In supporting his submissions that there was a disclosure to the skilled man in the art to form the basis for the application, Mr Drysdale-Wilson quoted passages in Terrell (13th Edition) which read:-

"The specification must disclose the invention in a manner which is clear enough and complete enough for the invention to be performed by a person skilled in the art" (which is essentially Section 14(3) of the Act.)

"What is disclosed is a question of construction for the judge when properly instructed". However it was submitted that the disclosure may be explicit or implicit and evidence will be necessary to instruct the judge as to what would be implicit to the skilled man in the art. Mr Drysdale-Wilson added that it should be noted that it is not necessary to describe the best method known to the applicant.

Turning then to the three things set out in the Official letter of 6 January 1983 and dealing first with the examiners objection itemized (ii) and concerning the mixture remaining in the vapour phase, Mr Drysdale-Wilson said that this was the characterizing feature of the claim. Due to the temperature drop on mixing the two relevant gases, if one's starting temperature and pressure is such that a two phase state results, then as in the prior art a two phase separator is required (page 1, line 30 of GB 2043608A). However, at the temperature and pressure given on page 4, lines 16 to 18 of GB 2043608A (viz 138°C and 47.5 Kg/cm^2 the combined mixture is in the vapour state before passing into the heat exchanger 102. Mr Drysdale-Wilson also pointed out that page 4, line 29 et seq of the specification states that the two phase distributors used in the prior art are omitted. A Statutory Declaration by MR J E ARREGGER filed at the hearing also affirmed that the mixture in question would be gaseous (see paragraph 8 of the Declaration). Accordingly, it was submitted that in so far as the claim specifies that nitrogen wash is warmed and the mixture with cold nitrogen remains in the vapour phase, there was no additional matter in the application.

Going then to the third (objection) in the letter of the 6 January 1983, [see (iii)], concerning the omission of the recycling of impurity stream from the bottom of the wash column, Mr Drysdale-Wilson submitted that this was a part of the system as a whole as seen from Figure 1, that is a part of the apparatus and known method. The present application does not to this degree relate to the entire apparatus. Moreover, in this connection Mr Drysdale-Wilson submitted that the omission of the statement that the impurity stream was recycled did not contravene the provisions of Section 76(1). He held that one can broaden the claim provided that the disclosure was not added to and in support thereof he quoted and compared Section 76(2)(a) and (b), which he said allowed that prior to grant of a patent, although one cannot extend one's disclosure, one can broaden the protection that one is claiming.

Dealing then with the first point (i) in the examiner's letter, viz general references to cooling and warming the gas streams as compared to specific

references to the use of heat exchangers for said purposes, Mr Drysdale-Wilson submitted that apart from a chemical reaction one could almost say that anything is a heat exchanger. In support, Mr Arregger in paragraph 7 of his Statutory Declaration states that in the context of the present subject matter, references to cooling and warming automatically imply that a heat exchanger is present.

Having read in full the Statutory Declaration of MR ARREGGER, Mr Drysdale-Wilson then stated, and I quote:

> "It is, therefore, my submission that the present divisional application discloses an invention, if you like, which relates to the warming of the nitrogen wash product from the top of the wash column before it is mixed with the nitrogen flow from 109 thereby getting rid of the requirement to have the two phase distributor in the front of 102. As we have been through it, that is disclosed in the previous parent application. It is a matter of question whether it was disclosed explicitly or implicity, but, in my submission, it was nevertheless disclosed to the person who the patent was intended for".

Mr Drysdale-Wilson submissions have required careful consideration and it undoubtedly appears that there is subject matter forming a basis for the claim of the application. Nevertheless there remains the question as to whether the requirements of Section 76(1) are offended by the broadening of said claim in that certain temperature and pressure limitations do not appear in steps of the claim which steps apparently should correspond to steps in the claims of GB 2043608A. In particular, the claim of the application specifies that the method comprises the steps of cooling said stream rich in hydrogen and said stream of nitrogen, introducing said stream rich in hydrogen into the lower portion of a nitrogen wash column, introducing part of said nitrogen into the top of said nitrogen wash column as reflux, extracting vapour rich in hydrogen and containing nitrogen from the top of the nitrogen wash column and mixing said vapour with cold nitrogen to produce ammonia synthesis gas. In GB 2043608A, however, the part of the nitrogen which is mixed with the washed hydrogen is cooled to a temperature which:

(a) if the nitrogen is above its critical pressure is between 8 and 28°C above its critical temperature;

or

(b) if the nitrogen is below its critical pressure is between 3 and 9°C above its dew point.

The other part of the nitrogen used as reflux in the wash column is first further cooled to below its critical temperature. The whole of the disclosure and the claims of GB 2043608A are limited as above and there is no suggestion anywhere in the specification that the cooling may be outside these limitations. In this connection I find that I cannot accept the assertion in paragraph 6 of the Statutory Declaration that every step of the claim of the application is fully disclosed in the description. Thus in paragraph 6 Mr Arregger has omitted certain temperatures to which the streams of hydrogen and nitrogen are cooled. Furthermore, although he acknowledges that the nitrogen introduced into the top of the wash column is at -187°C and 47.7 Kg/cm^2, ie below its critical temperature, there is no such limitation in the claim. The claim of the application appears to be a generalisation based on the specific disclosure at page 4, lines 11-18 of GB 2043608A. In that the claim comprises the particular steps of "cooling said stream rich in hydrogen and said stream of nitrogen", "introducing part of the nitrogen into the top of the nitrogen wash column as reflex", and "mixing said vapour with cold nitrogen", but without said steps having any reference to temperatures associated with the critical pressure and temperature of nitrogen, it seems that the objection under Section 76(1) that the claim comprises added matter is well founded. Mr Drysdale-Wilson submitted that by comparison of Section 76(2)(a) and (b), the situation prior to grant is that although one cannot extend one's disclosure, one can broaden the protection that one is claiming. However, the phrase "any such matter" in Section 76(2) (a) must refer back to the phrase "any matter" in Section 76(1) and therefore the requirement still prevails that the later application may not disclose matter which extends beyond that disclosed in the earlier application and this is whether said disclosure is explicit or implicit (cf PROTONED B.V.'s Application 1983 FSR 110). In reply to my query as to the omission of the temperature limitations from the claim of the application, Mr Drysdale-Wilson stated that both GB 2043608A and the application relate to cryogenic processes. This however, does not seem to be fully reflected in the claim of the application. It was also submitted that the avoidance of the formation of two phases by warming, as in the claim, is something which is not critical to the precise temperatures specified in GB 2043608A. However, any general form of claim based on such a disclosure must be claim broadening if it implicitly covers something workable but not disclosed. In response to my further query, Mr Drysdale-Wilson stated that the method of GB 2043608A would not work (at least commercially) outside the temperature ranges specified, these having been worked out after a lot of computing. If other temperatures were operable the original parent claim

would have covered that range.

Mr Drysdale-Wilson in support of his assertion that the invention of the application is disclosed in the description of GB 2043608A, made reference to MR JUSTICE WHITFORD'S decision of 9 Feb 83 affirming the Hearing Officer's refusal of RTL CONTACTOR HOLDINGS application number 7932835; this case being analogous to the present one in that a proposed divisional application had a description identical to that of the parent. In the parent GB 2026889A, a contactor for contacting liquids/solids/slurries had a rotor formed into compartments by discs carried by tie rods. Subsequently, the applicants (RTL) found that the tie rods were not necessary and filed a divisional application omitting the tie rods. Mr Drysdale-Wilson differentiated this as a situation wherein the invention being disclosed in their divisional application was something which they had not said could exist in the parent. However, to me, it seems that the present situation is analogous in that GB 2043608A and the application have identical descriptions and in that certain steps of the single claim of the application omit temperature limitations of the parent without this having been said to be possible. Although it is possible to postulate another invention has been disclosed in the description of GB 2043608A, viz. the formation of a two phase system is avoided on mixing of gases at 207 of Figure 2, nevertheless this disclosure is bound to the series of steps claimed and particularly described with reference to Figure 2. Generalization of such an invention may be made only if the claim does not include within its scope workable matter not previously disclosed. Accordingly, I attach considerable importance to the question posed at the Hearing, namely as to whether one can go outside the temperature limitations specified in the claims of GB 2043608A and still have a method and apparatus that would work. In reply Mr Drysdale-Wilson stated that clarification would be sought from the inventor and as the adjournment of the Hearing did not afford sufficient time to prepare the matter properly, he requested that they be allowed to file a Statutory Declaration by the inventor on this point. This I agreed to and a Statutory Declaration by Mr Brian Alfred McNeil was subsequently filed on 1 July 1983, an accompanying letter from MR B LUCAS being included. The declaration contains much on the economics of the methods and apparatuses of GB 2043608A and the practicality of operating within the specified temperature ranges. However, in paragraphs 2 and 3 there is a clear statement that the temperature limits set out in the claims of the specification are not essential. Consequently operation of the methods/apparatuses is possible at conditions of cooling of hydrogen and nitrogen streams not disclosed in

GB 2043608A but included within the generalized form of claim of application 8232183. In this connection Mr B Lucas intimated in his letter that some explanation of Mr McNeil's statements could be provided and accordingly the applicants were afforded a further opportunity to be heard. In a letter of reply dated 19 Aug 83, Mr B Lucas stated that the applicants did not wish to make any further oral representations, but he wished to record a further point relating to the efforts being made to harmonize the patent laws of various countries throughout Europe. However as the divisional European application corresponding to the present application had not at the date of the letter been granted, and as the resolution on conformity referred to in Section 130(7) of the Patents Act 1977 does not specify Section 76, I find that I cannot take cognizance of this submission.

In the event I find that the claim of the present application by implication discloses subject matter which extends beyond that disclosed in GB 2043680A and thus offends Section 76(1) of the Patents Act 1977.

In the result, I uphold the examiner's objection that Application 8232183 contravenes the provisions of Section 76(1) and that it fails to satisfy the requirement for a divisional application as laid down by the Patents Court in Hydroacoustics Inc Applications. Accordingly, Application 8232183 cannot be allowed to be filed under Section 15(4).

Dated this 9ND day of SEPTEMBER 1983

D A FOLEY
Principal Examiner, acting for the Comptroller-General

PATENT OFFICE