

COMMISSIONER'S DECISION

Novelty: Air Cushion Vehicles As Ice Breakers

Sheet ice is broken using an air cushion vehicle either by itself or attached to the prow of vessels to exert force on top of the ice sheet, while at the same time forcing air beneath the front edge of the ice to break it up. The method of amended claim 18 does not define the normal operation of an air cushion vehicle, and is novel. Further, such method was sufficiently described in the disclosure that it should not be rejected for inadequate disclosure.

Final Action: Reversed.

Patent application 181,621 (Class 114-11), was filed on September 21, 1973, for an invention entitled "Surface Effect Ice Breaker." The inventors are John D. Bennett et al, assignors to Sun Oil Company. The examiner in charge of the application took a Final Action on July 19, 1978, refusing to allow it to proceed to patent. In reviewing the rejection, the Patent Appeal Board held a Hearing on December 13, 1979, and at which the applicant was represented by Mr. G. Fisk.

The application is directed to an ice breaker apparatus for use with conventional vessels and more particularly we are concerned with a method for breaking an ice sheet in ice covered waters. The claims to the apparatus were not under rejection.

In the Final Action the examiner refused method claims 18 and 19 because they: 1) lack novelty in view of conventional air cushion vehicles and their method of operation which is common knowledge; and 2) are broader than the disclosure.

In that action the examiner argued that the rejected claims lack novelty because they are directed solely to the structure and operation of well known flexible skirted A.C.V.'s (air cushion vehicle). He maintains that the mere recitation that the A.C.V. is used as an icebreaker does not overcome the lack of novelty of the structure and method recited in these claims. He also maintains that the claims cover the operation of a device broader than that contemplated by the applicant in his disclosure.

He goes on to say that the claims cover the use of an air cushion vehicle as an icebreaker since the propelling means would be an air screw or fan used to propel an air cushion vehicle.

In response to the Final Action the applicant cancelled claims 18, 19 and 20 and submitted a new claim 18.

The applicant argues that new claim 18 did indeed overcome the objections raised in the Final Action. He explained the nature of his invention and maintained that he clearly described in his disclosure a preferred embodiment of a broader concept. He now wishes to define in his claims the monopoly related the broader concept.

The consideration before the Board is whether or not the applicant is permitted to do this in the present circumstances and if so, is the method of operation common knowledge.

Subsequent to the Hearing, an Affidavit signed by one of the inventors, Mr. C.M. Mason, was submitted to the Board. Parts 3 to 8 of that Affidavit are pertinent and are reproduced below:

3. The joint development as originally planned included testing of the ACT-100 in the Arctic as a vehicle for transporting drilling equipment over ice sheets strong enough to support the vehicle without breaking. However, prior to the first operational tests which were performed over ice, the possibility of encountering ice of insufficient supporting strength, with resulting fracture of the ice, was recognized. In view of the potential problems involved in such fracture, and the possibilities then recognized of being able to operate the ACT-100 in an icebreaking mode, the original development program was modified to include tests of the ACT-100 in ice-covered waters to determine whether it would successfully operate as an icebreaker to open a path through ice sheets and if so, through what thicknesses of ice sheets it would thus operate.

4. The first such test was conducted in November, 1971 with myself and other personnel of Sun, and personnel of Arctic Engineers participating. In this test, the vehicle was pulled toward the edge of an ice sheet, while operating in the air cushion mode. It was found that when the forward skirt of the ACT-100 was positioned over the edge of the ice sheet, the air forced beneath the vehicle displaced the water from beneath the ice and formed an air gap

between the ice and the water. Portions of the ice sheet then broke from the sheet and as the ACT-100 moved forward, passed beneath the ACT-100 and through the flexible skirt at the rear of the vehicle. In this way, the vehicle was found to be movable through the ice, breaking the ice as it went and leaving the pieces of broken ice behind it.

5. I was present on the ACT-100 on the first such test. While stationed in the forward observation room of the ACT-100, which was constructed in such fashion as to permit visual observation beneath the edge of the ice sheet toward which the ACT-100 was advanced, I directly visually observed the phenomenon of the formation of an air gap beneath the ice and the breaking of the ice above the air gap. To the best of my knowledge and recollection, I first learned of this phenomenon as the direct result of my own visual observation, on the first occasion that the phenomenon was observed and reported.

6. From this observation, I concluded that a non-self-propelled air cushion vehicle such as the ACT-100 was capable of breaking ice and clearing a path through an ice sheet in the manner observed. To the best of my knowledge, this was the first demonstration of the ability of an air cushion vehicle to open a channel for navigation through ice sheets, and was the first time that anyone had either conceived or observed the breaking of ice sheets by forcing air beneath the edge of the ice sheet to form an air gap therebeneath, with resulting fracture of the sheet unsupported by water.

7. After I had observed the test described above, I and Mr. Bennett, in conversation, conceived applying the same method to a self-propelled ice-breaking vessel. It was evident to us at that time that any self-propelled vessel would operate as an ice-breaker if it was provided with an enclosed volume having flexible walls, and a fan or like object to pressurize air within the enclosed volume. We realized that the volume could be pushed forward by the self-propelled vehicle so that the lower portion of the volume was in contact partially with the ice and partially with the water adjacent the ice. The fan could then force air downwardly into the volume, while force was being exerted by the weight of the vehicle on the top of the ice sheet. This would force air beneath the front edge of the ice sheet, and would cause failure in the ice similar to the failure which occurred in the test with the ACT-100. We realized that ice portions would separate from the ice sheet, and that, by moving the volume toward the remainder of the ice sheet, the ice portions would pass rearwardly through the flexible boundary.

8. It was evident to Mr. Bennett and myself that the vessel used to perform this method could either be an air-cushion vessel (ACV) such as the type known under the trade name "Hovercraft" or a conventional vessel, having a hull floating in the water. At the time however, our preferred design was to use a conventional hull vessel, with an enclosed volume mounted on the front of it, and we felt that such a vessel would be more suited to the rigors of the Arctic than an ACV. We were, however, certain that a self-propelled ACV would be able to perform the method, in view of the successful testing of the ACT-100 set out in paragraph 4 above.

From the above it appears clear that the inventors were aware of the broad concept of breaking ice with a non-self-propelled or a self-propelled air cushion vehicle. We therefore have no reason to disagree with what is set forth in the Affidavit and we take it that the broad concept of the invention was at least known prior to filing this application.

The question, however, of support in the disclosure for the broad concept is still a question which must be answered. We will now consider that question. Amended claim 18 reads:

Method for breaking an ice sheet in ice-covered waters which comprises providing ice breaking apparatus having propelling means integral therewith and comprising an enclosed volume having a flexible boundary, within which volume air can be pressurized and the lower portion of which volume air can be pressurized and the lower portion of which volume is in contact with the ice and with the water adjacent the ice; forcing air downwardly into said volume, exerting force on top of the ice sheet; forcing air beneath the front edge of the ice sheet, whereby failure occurs in the ice and ice portions separate from the ice sheet; and moving said volume toward the remaining ice sheet whereby the ice portions pass through said flexible boundary.

Assuming for the moment that an invention is defined in claim 18, supra, what we must now find in the disclosure is a description of that invention or in other words we must find an invention described which will support the broad scope of monopoly sought in claim 18.

The applicant has clearly set out a "Description of the Preferred Embodiments" in his disclosure and relates it to Figure 1 of the drawings. This figure, shown below, "describes a cross sectional elevational view of a vessel having an attached surface effect ice breaker."

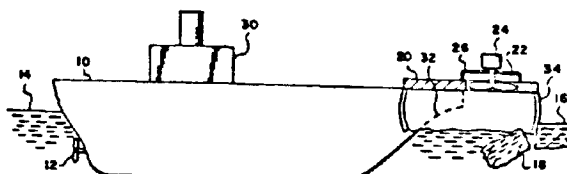


FIG. 1

Claim 18, supra, in our view, defines subject matter which is broader in scope than that embodiment, but this of course is not fatal. The specific question is whether or not there is a broader description of an invention than that described by the preferred embodiment.

We have carefully reviewed the disclosure and we find from the "Background Of The Invention" that the first line reads: "This invention relates to apparatus attached to a vessel for breaking ice." One object of the invention is given as: "It is therefore an object of the present invention to provide an improved apparatus for breaking ice." The summary of the invention is given as: "With this and other objects in view, the present invention contemplates an ice breaking apparatus for use with vessels transversing ice covered waters. The apparatus includes a platform having a flexible material extending downwardly therefrom, and means for forcing a gas beneath the platform."

On page 5, line 15 f.f. , a description of the operation of the apparatus is given which reads:

... When an ice sheet 16 [see Figure 1, supra] is encountered power is supplied to the fan 22 which pulls air from above the deck 20 to beneath the deck and within the confines of the skirt 34. The skirt and deck together with the surface of the ice and water below the deck enclose a volume within which air can be pressurized. As air is forced under the deck 20 by the fan 22 a force is exerted on the top of the ice sheet 16. In addition, air is forced beneath the front edge of the ice sheet 16. With the combination of the force being applied to the top of the ice and the lack of water support beneath the ice sheet 16 due to its displacement by air, failure occurs in the ice so as to separate an ice portion 18 from the ice sheet 16.

A critical passage follows on page 10, line 6 f.f. , and reads:

This ice breaker mechanism acts in a similar manner to a conventional surface effect vehicle. It has been found in tests with large surface effect vehicles that thick ice sections fail when they are traversed by these vehicles. It has been determined that the reason for such failure is the vehicle's ability to force air beneath the ice sheet and place the leading edge of the ice sheet in a cantilever position causing failure when the load of the vehicle acts on the upper surface of the ice sheet.

We come to the last paragraph of the disclosure which reads:

While particular embodiments of the present invention have been shown and described it is apparent that changes and modifications may be made without departing from this invention in its broader aspects. The aim in the appended claims is to cover all such changes and modifications which fall within the true spirit and scope of this invention.

We also refer to a paper, discussed by Mr. Fisk, entitled "Improvements in Icebreaking by Use of Air Cushion Technology." On page 2, when discussing what went on in the winter of 1971-72, it states that: "... heavy air cushion transporter ACT-100 continuously broke fresh water first year ice...."

Mr. Fisk assures us that this is the same machine referred to on page 6 of the disclosure, see quote, above. Also the ACT 100 is the machine referred to in the inventors Affidavit, supra.

We point out at this time that the claim before the Board is not the same claim, although somewhat similar to the claim which was considered by the examiner.

We have carefully reviewed the scope of monopoly of the method in claim 18. We note that this claim describes a method which reads strikingly close to that cited above from page 5 of the disclosure. We find that the only portion that gives us some concern is the term "apparatus". This term is clearly broader than the apparatus of the preferred embodiment. It is however settled law, as mentioned, that you do not have to disclose every embodiment within the scope of your claim provided that from your claim there is a reasonable expectation that the man skilled in the art would be aware of things which could be used as equivalents. We are therefore satisfied, in view of all the above points raised, that claim 18 defines the limits of the scope of monopoly of an invention that is described in sufficient detail

in the disclosure of this application. We recommend that this objection be withdrawn.

We will now consider the second objection to the claims, i.e. "as lacking novelty in view of conventional air cushion vehicles and their method of operation which is common knowledge."

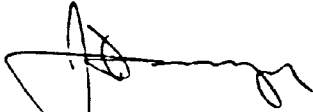
We must remember that claim 18 is directed to a "method for breaking an ice sheet in ice-covered waters ... exerting force on top of the ice sheet, forcing air beneath the front edge of the ice sheet, whereby failure occurs in the ice and the ice portions separate from the ice sheet...." This is clearly not the normal method of operation of an air cushion vehicle.

It was brought out at the Hearing that this might have accidentally happened before. We do not feel however that we can refuse a claim on a chance or possible happening. We feel we must go along with the Affidavit, supra, where it was stated that it was the first time the particular ice breaking phenomenon, known as the cantilever mode, was ever observed. We agree with the examiner that the method of operating an air cushion vehicle "including controlling the cushion pressure" is common knowledge. We find however, that this is not the scope of monopoly sought in claim 18, above. We are therefore satisfied that claim 18 should not be refused on the ground that it is defining what is common general knowledge. In our view, the subject matter of the claim is novel and defines an invention which is described in the disclosure.

To summarize, we recommend that the rejections in the Final Action should be withdrawn in so far as they apply to amended claim 18.


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

I have carefully reviewed the prosecution of this application and considered the recommendation of the Patent Appeal Board. I concur with the recommendation of the Board. Accordingly, I accept claim 18. The application is returned to the examiner for resumption of prosecution.

A handwritten signature in black ink, appearing to read 'J.H.A. Gariépy', with a stylized, flowing script.

J.H.A. Gariépy
Commissioner of Patents

Dated at Hull, Quebec

this 1st. day of May, 1979