

COMMISSIONER'S DECISION

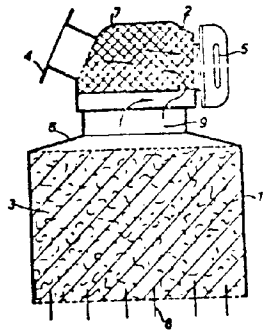
Obviousness: Gas Mask

The apparatus includes a heat exchanger for cooling inhalation air. The heat exchanger is comprised of a duct which houses a plastic material of low conductivity. Test information was used to convince the Office that an unexpected result was achieved by using plastic in lieu of metal in the heat exchanger. An amended claim was found allowable.

Final Action: Withdrawn - an amended claim accepted.

This decision deals with a request for review by the Commissioner of Patents of the Examiner's Final Action dated April 29, 1976, on application 188,192 (Class 137-1.52). The application was filed on December 14, 1973, in the name of Wolfgang Eckstein, and is entitled "Respiratory Apparatus." The Patent Appeal Board conducted a Hearing on March 15, 1978, at which Mr. I. Makinson represented the applicant. Also in attendance was Mrs. J. Harding of the same firm.

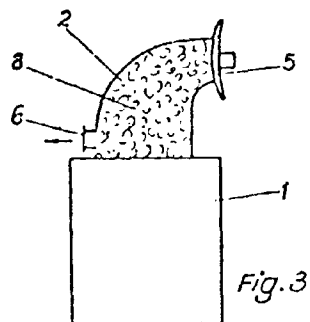
The application is directed to a respiratory apparatus. More specifically it is a filter-type self-rescue apparatus which includes a heat exchanger for cooling inhalation gas. The heat exchanger is comprised of a duct which houses a material of low conductivity. Figure 1 shown below is illustrative of that arrangement:



In the Final Action the examiner rejected the application in view of the following British Patents:

1,051,054	Dec. 14, 1966	Auergesellschaft
1,115,349	May 29, 1969	Auergesellschaft

Patent 1,051,054 is directed to a breathing apparatus consisting of a carbon monoxide oxidation catalyst, a heat exchanger and a mouthpiece; the heat exchanger is located between the oxidation catalyst container and the mouthpiece. The heat exchanger is filled with material such as metal wire or metal wool. Figure 3, shown below, is illustrative of that patent:



Patent 1,111,534 is similar to the above discussed patent (same applicant), but it also includes a means to collect and expel saliva entering the heat exchanger.

In the Final Action the examiner had, inter alia, this to say:

...

The British patent 1,051,054 teaches a breathing apparatus consisting of a carbon monoxide oxidation catalyst, a heat exchanger and a mouthpiece; the heat exchanger is located between the oxidation catalyst container and the mouthpiece. The heat exchanger is filled with material having good thermal conductivity, in a manner such that inspired air dissipates its heat to the said material of good thermal conductivity.

Although not stated in this patent, saliva also enters the heat exchanger and therefore also acts as a coolant for the inhalation air in the same manner as that in applicant's device, this is born out by the British patent 1,115,349 issued to the same applicant as that of the patent discussed above; this second patent includes a means to collect and expel saliva entering the heat exchanger.

The cited patent 1,051,054, therefore differs from the instant application in that applicant uses, in the heat exchanger, material of low heat conductivity; the use of material of low heat conductivity in a heat exchanger however is equivalent to dividing a flow channel into smaller passages by means of a material which insulates against radiation or conduction of heat.

The only means of heat dissipation in applicant's device is the utilization of moisture such as saliva exhaled and let out by the user of the breathing device to cool the inhaled air. Such means of cooling however is inherent in the device disclosed by the patent 1,051,054, which is distinctly born out by the cited patent 1,115,349 both issued to the same applicant, and as discussed above.

Now, since the apparatus in the cited patents is similar to, and perform its intended task in a similar manner, then it is held that the instant application does not contain matter of patentable significance. The mere omission of good heat conducting material in the instant application and the substitution in its place by material which acts as an insulator to heat in a heat exchanger is not considered to be of patentable significance.

The use of moisture exhaled by the user of the breathing apparatus to cool inhalation air, is also used by the cited patent, in a manner similar to that in the instant application.

The argument presented by applicant in his letter dated December 18, 1975, has been considered, however, such argument does not overcome the above discussed objection.

A reply to such argument as, "a surprising result flows from the use of material of low thermal conductivity" is discussed in detail above.

In view of the above discussion, it is held that this application lacks in an inventive step, and also the matter disclosed and claimed by this application is obvious to one skilled in the art in view of the teaching of the cited reference patent, hence the refusal of allowing this application to patent is maintained.

...

The applicant, in his response to the Final Action, added new claims 10 and 11 and stated his position which reads (in part):

...

The incoming air is heated by the catalytic oxidation in the filter and must be cooled in a heat exchanger before inhalation. The present invention achieves such cooling by means of a process known as "evaporative cooling", utilizing the moisture exhaled by the user as the evaporating medium. It is a well known principle of thermodynamics that heat must be added to a liquid of a given temperature to convert it to vapour of the same temperature. The heat required to convert a unit amount of liquid into vapour is called the heat of vaporization. Thus, it is possible to reduce the temperature of, e.g., air, by evaporating some liquid in contact with such air, usually on a large surface, utilizing the heat content of the air to provide the heat of vaporization of a liquid. Such process may be described as a process of "evaporative cooling".

In the apparatus of the present invention, moisture from the exhaled air is deposited, by condensation or otherwise (possibly fine droplets) on the relatively large surface of the material contained in the heat exchanger. Any heat of condensation (the physical opposite of heat of vaporization) is carried away by the exhaled air and thus removed from the system. At this point, the significance of the requirement that the material contained in the heat exchanger be of low thermal conductivity may be firstly observed. Namely, if any heat is liberated by any condensation of the water content of the exhaled air, such heat will not be conducted into the interior of the filler material but will remain at the surface available to be transferred to the exhaled air. When hot air is inhaled into the heat exchanger, the liquid contained on the surface of the heat exchanger is evaporated and the inhaled air is cooled by the removal of the heat of vaporization as described above. Due to the relatively large surface of the material contained in the heat exchanger, the effect of the evaporative cooling is pronounced. It is critical to the proper function of the evaporative step that the material contained in the heat exchanger be of low thermal conductivity in order that it does not carry the heat contained in the inhaled air into its interior and store it as a heat sink but allow such heat to remain at the surface to be available to vaporize the liquid thereon.

...

The applicant does not agree with the examiner's assertion that "the use of material of low effect conductivity in a heat exchanger... is equivalent to dividing the flow channel into small passages by means of a material which insulate against radiation or conduction of heat". The crucial reason why the present invention employs a material of low thermal conductivity in the heat exchanger is to prevent a significant flow of heat from the surface to the interior of such material. The reason for this is two-fold. Firstly, it is undesirable that the material in the heat exchanger act as a heat sink and accumulate the heat from the inhaled gas and, secondly, the present invention requires that the surface or surfaces of the filler material and the heat exchanger, but not its interior, be raised to a fairly high temperature during the inhalation of the hot gas, so that the saliva previously condensed or otherwise deposited thereon evaporates and, so that its heat of vaporization results in cooling of the inhaled air as fully explained above.

The question before the Board is whether or not the applicant has made a patentable advance in the art. Our first consideration will be to determine whether or not a patentable invention has been described in the application as filed. This must be determined from the advance made over the teachings of the cited art.

On a complete study of the application we find that there are a number of differences. It appears that the applicant has taken the known method of evaporative cooling and incorporated it into a device not suggested by the

cited art, e.g. there is no teaching of a heat exchange chamber filled with plastic material in the form of wires, chips, screens, granules, balls or tubes.

Mr. Makinson argued that the present device is patentable because, inter alia, it gave unexpected results in tests carried out in comparison to known apparatus. In view of our hesitancy in deciding whether an invention is described, we decided, after the Hearing, to request a copy of the test results to analyse them to see what the improved or unexpected results were. This was submitted by the applicant on April 28, 1978. It is in the form of a test report, dated September 6, 1972, which sets out the results of a comparison of respiratory apparatus of the present invention with that of the prior art. The tests were carried out by "Development and Constructions - FILTERTECHNIK" and they indicate that by using the conventional construction, with a spun metal material in the housing, the inhaled air was cooled to 57°C, while the present apparatus, using a plastic granulate in the housing, cooled the air to an average of about 50°C. We note that the tests on the present apparatus was carried out with plastic materials only in the heat exchanger.

In view of the above considerations we are satisfied that an invention has been described in the disclosure, because the applicant devised an apparatus which performs in an unexpected, improved or more expeditious manner.

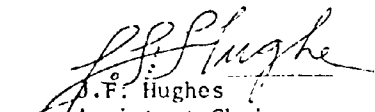
On a complete review of the claims we are not satisfied that they distinctly define the scope of monopoly of the invention commensurate with what, in our view, is the invention described in the disclosure, and for which the test results were provided. For example, claim 1 merely defines over the cited art by stating that the material of the heat exchanger is of low thermal conductivity. We believe that a claim drawn along the following lines would be acceptable.

Claim 1:

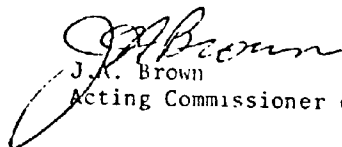
A filter respirator for self-protection against carbon monoxide and which has a catalyst portion which operates at high temperatures and a mouthpiece casing portion which is operable to cool respired air by the evaporation of the user's saliva, comprising a catalyst casing having an air inlet and an internal passage filled with a catalyst material, and a mouthpiece casing connected to said catalyst casing with passage means for a flow of air from the catalyst casing through said mouthpiece casing, said mouthpiece portion casing containing an internal heat exchanger chamber filled with a plastic material of low thermal conductivity in the form of wires, chips, screens, granules, balls or tubes, through which the exhaled air is passed so that the saliva adheres to the material and the subsequent inhaled air is cooled by the evaporation of the saliva, and an exhalation valve connected to said passage means downstream of said passage means with respect to exhalation gas flow.

This claim is essentially claim 8 of the present claims, but the scope of monopoly of the invention is defined in more explicit terms.

To summarize, we are satisfied that a patentable advance in the art has been made and we recommend that the decision in the Final Action to refuse the application be withdrawn. We recommend that proposed claim 1 be accepted along with any other appropriately dependent claims.


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

I have reviewed the prosecution of this application and agree with the recommendation of the Patent Appeal Board. Accordingly, I withdraw the Final Action, but I refuse to accept the present claims. I will, however, accept the claim proposed by the Board. The applicant has six months to cancel the present claims, submit an appropriate amendment, or to appeal my decision under the provision of Section 44 of the Patent Act.


J.K. Brown
Acting Commissioner of Patents

Dated at Hull, Quebec

this 19th. day of May, 1978

Agent for Applicant

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