

COMMISSIONER'S DECISION

OBVIOUSNESS; SECTION 45(4): Windshield Defogging Device

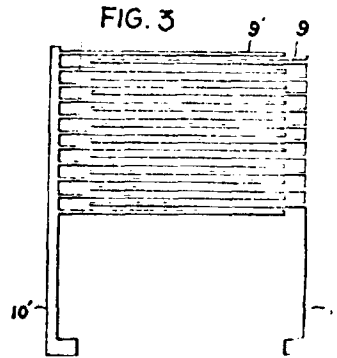
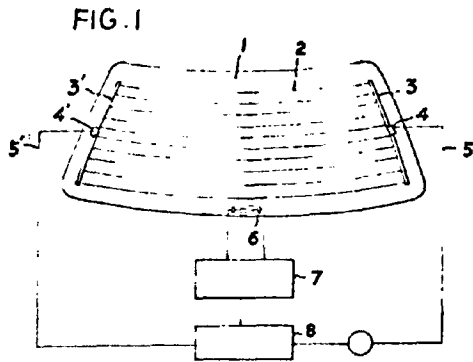
The differences between the applicant's device and the prior art do not amount to invention. In the three rejected claims the sensor which activates the heating element is inoperative below 100% humidity. The prior art sensors are activated below 100% R.H.

Final Action: Affirmed.

This decision deals with a request for review by the Commissioner of Patents of a refusal of claims C1 to C3 inclusive of patent application 150,413. The refusal was made under Section 42 of the Patent Act, and was made by a letter dated November 25, 1975 issued as the result of re-examination of the claims under Section 45(4) during conflict proceedings.

The application was filed on December 17, 1971 in the name of Takeomi Nagasima for a "Defogging Glass Plate". Mr. N. Hewitt represented the applicant at the Hearing conducted by the Patent Appeal Board on June 16, 1976.

This invention is for a glass plate containing electric heating elements which drives off any moisture condensing on the glass. It may be, for example, an automobile windshield, which is kept clear of moisture, frost, ice etc. by the heating element. The electrical heating strip on the glass surface is actuated by a moisture sensor containing a pair of spaced electrodes. When moisture is detected by the sensor, an electric heating circuit is actuated to remove the moisture by heat. Figures 1 and 3 given below show the basic component elements of the invention.



Claim C1, which is typical, reads as follows:

A defogging glass plate which comprises an electric heating element in contact with the glass plate, said glass plate having a moisture detecting sensitivity amplifying region provided thereon, a sensor having a pair of electrodes which are arranged in parallel with a gap of 0.2 mm therebetween and which are fitted on the surface of the glass plate for automatically detecting the presence of a water film in said gap, a detecting circuit actuatable by said sensors in detecting a water film in said gap, and a control circuit actuatable by said detecting circuit to cause heating of the electric heating element when a water film is present in the gap.

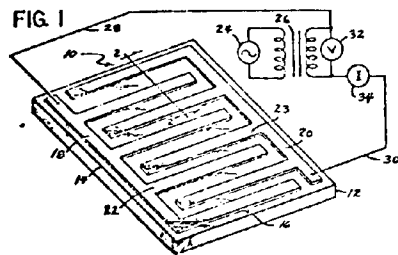
In the office letter claims C1 to C3 were refused for failing to patentably distinguish over the following prior art

British Patent	884,967	Dec. 20, 1961	Miskin
U.S. Patents	3,071,746	Jan. 1, 1963	Kohl
	2,735,907	Feb. 21, 1956	Inman
	2,424,735	July 29, 1947	Boothroyd
	3,255,324	June 7, 1966	Ovshinsky

The Miskin citation discloses a vehicle windscreen combined with electrical heating means. Sensors in the form of spaced electrodes on the glass surface respond to changes in electrical resistance produced by mist formation and actuate the heating means. Claim 1 of Miskin reads as follows:

A vehicle windscreen or other transparent body of electrically non-conductive material or of a material of high electrical resistance, having upon its surface electrodes connected to means responsive to changes of electrical resistance and associated with and arranged to control the operation of means to prevent or reduce misting of the said surface when this tends to take place as a result of conductive deposits such as would be produced by condensation of water vapour thereon.

The Kohl patent claims a humidity sensing device which comprises spaced sensing electrodes mounted on the surface of an adsorbing base, such as quartz. Figure 1 in the Kohl patent depicts his invention.



The Inman reference shows a moisture activated circuit sensor for measuring the presence of falling rain. Boothroyd is concerned with a humidity control apparatus for use in a refrigerated compartment. Ovshinsky relates to an electrical moisture-responsive controlling device for closing an electrical circuit. It is activated by moisture in the surrounding environment.

The office letter stated (in part):

Claim C1 defines:

A defogging glass plate  
etc., ...the glass plate,

Prior art describes:

See Miskin at page 1  
lines 20-28 and claim 2  
wherein he describes and  
claims an electrical heating  
element to reduce or prevent  
misting of a glass surface such  
as a vehicle windscreen,

said glass plate having a moisture detecting sensitivity amplifying region provided thereon,

While Miskin does not discuss such a structure in his patent, yet it is held to be an obvious and un inventive step in view of Kohl who describes a humidity sensor similar to that of applicant having an electrode bearing quartz surface, roughened by grinding to reduce resistivity of the sensor. See Figs. 5 and 6 (40, 42, 44) and Column 1 lines 29-38 and Column 3 lines 18-27,

a sensor having a pair of electrodes which are arranged in parallel with a gap of 0.2 mm therebetween etc., ...in said gap,

Miskin in his patent, describes two strip electrodes attached to a glass window and arranged in a parallel configuration as may be seen at page 1 lines 33-42 and in his lowermost drawing. The definition whereby the gap is 0.2 mm. lacks patentable significance in that such spacing may be varied to produce any desired operating point of the sensor determined by voltage and degree of moisture to be sensed. Miskin discusses an electrode spacing of six inches while the cited patents of Inman and Boothroyd who both show humidity sensors of the type claimed in C1, describe a gap of approximately 0.4 mm. See Boothroyd at Column 4 lines 59-63 and Inman at Column 2 lines 28-31,

a detecting circuit actuatable etc., ... when a water film is present in the gap.

Miskin describes a circuit in his disclosure and as illustrated in his upper figure of the drawings, which includes the detecting and control circuit as claimed in C1.

Claim C2 defines:

The defogging glass plate of claim 6 (C1) wherein said moisture detecting sensitivity amplifying region is prepared by sand blasting to the glass plate.

Prior art describes:

As discussed supra in conjunction with Kohl, see Figs. 5 and 6 (40, 42, 44) and Column 1, lines 29-38 and Column 3, lines 18-27.

Claim C3 defines:

The defogging glass plate etc., ...by applying hydrophilic material to the glass plate.

Prior art describes:

See Ovshinsky at Column 2 lines 3 to 21 and Column 5 lines 6 to 30 who describes the use of a lithium compound or composition having hydrophilic properties which is applied to the base on which are supported spaced, parallel electrodes to reduce electrical resistance between the electrodes.

In his responses of March 24, 1976 and June 1, 1976 to the Office letter, the applicant stated (in part):

In particular, it is respectfully submitted that clearly Miskin does not disclose or teach the necessity of having a moisture detecting sensitivity amplifying region provided on the glass plate and the Examiner in order to overcome this omission of Miskin takes the position that this feature is obvious and un inventive in view of the humidity sensor of Kohl and the Examiner refers to Figures 5 and 6 of Kohl and the description associated therewith. Clearly, as admitted by the Examiner, Kohl is concerned with an electrode bearing quartz surface which is a completely different surface from a glass plate and the moisture detecting sensitivity amplifying region of Kohl is completely different from that of the present invention. /Further, in the sensor of the present invention it is a critical feature that the sensor has a pair of electrodes which are arranged in parallel with a gap from 0.1 to 10 mm therebetween and which are fitted to the surface of the glass plate for automatically detecting the presence of a water film in the gap. It is respectfully submitted that neither Miskin nor Kohl disclose such a feature and the Examiner takes the position insofar as the size of the gap is concerned that the particular limitations asserted by the applicant and for example in the conflict claims 0.2 mm lacks patentable significance. Clearly, within the overall range the spacing may be varied to produce any desired operating point for the sensor determined by voltage and degree of moisture to be sensed outside the aforesaid range as is clearly set forth in the disclosure the sensitivity is such as to severely limit the usefulness of the defogging plate. The primary reference upon which the Examiner is relying is Miskin which has an electrode spacing of six inches. It is respectfully submitted, that to modify Miskin where the gap is six inches which is of the order of 16 cm or a gap of 0.2 mm or the maximum 10 mm in claim 1 would not be obvious to a person skilled in the art as Miskin is concerned with a different type of sensor and the teachings of Inman and Boothroyd is submitted have no relevance in this direction. It is therefore submitted that the claims at

present on file clearly distinguish over the art cited by the Examiner. It is further submitted that conflict claim C1 defines an invention over the art. Insofar as conflict claims C2 and C3 are concerned, it is respectfully submitted that these clearly distinguish over the art. As aforesaid insofar as conflict claim C2 is concerned Kohl is concerned with a completely different material and a completely different type of humidity sensor and with regard to conflict claim C3 the Examiner has had to refer to Ovshinsky which is still a further reference in an attempt to anticipate the claim. It is respectfully submitted that the teachings of Ovshinsky which are again concerned with a different type of sensor have no relevance to the disclosures of Miskin which is the primary reference relied on by the Examiner.

...

It is respectfully submitted that the disclosure of Kohl and the invention set forth in Kohl is the fine grinding of a water adsorbent substrate in a sensor for sensing the relative humidity of the atmosphere and is for the purpose of reducing the circuit resistance of such a substrate at relative humidities in the range 0 to 100% as shown in Fig. 10 of Kohl. In contrast thereto conflict claims C1 is directed inter alia to the said blasting of a non-adsorbent substrate i.e. plate glass for the purpose of causing water vapour condensed thereon when the relative humidity is above 100% to form a water film to cause current conductance between the electrodes to actuate the detecting circuit. Thus it is submitted that Kohl effects a different process (fine grinding) of a different substrate (water adsorbent substrate) for a different purpose (to reduce circuit resistance) in the different device (relative humidity sensor) and as such the teachings of Kohl would have no relevance to the invention as set forth in conflict claim C1 (or C2). Further, the treatment of Kohl fine grinding in a plate glass substrate would have minimal effect in enhancing the formation of the water film.

What we must determine is whether claims C1 to C3 are directed to a patentable advance in the art.

At the hearing Mr. Hewitt conceded that the Miskin reference was directed to a similar device as his clients. The difference is in the sensor arrangement. He stated that the applicant's invention detects the presence of a water film, as compared to the detection of condensed vapor in the form of water droplets in Miskin. We agree that the Miskin sensor is different from that used by the applicant since in Miskin maximum sensitivity is obtained when his electrode elements are spaced six inches apart. In the applicant's device the gap ranges from 0.1 to 10 mm.

Considering the Kohl reference, we find there a humidity sensor having a roughened adsorbing element in which "comb" type electrodes are mounted. The applicant argues that Kohl "effects a different process (fine grinding) of a different substrate (water adsorbent substrate) for a different purpose (to reduce circuit resistance) in a different device (relative humidity sensor)."

Before commenting on Kohl we think it is important to define what is meant by "humidity". According to the text "Heating and Air Conditioning," by Burgess H. Jennings, March 1956, atmospheric air is defined as a "mechanical mixture of gases." Further:

Another important constituent of air is water vapor (steam). This vapor usually occurs in the form of superheated steam as an invisible gas. However, when air is cooled to a certain temperature (the so-called dew point) the steam in the air starts to condense and may be visible - as mist or fog, or as condensation on cold surfaces (dew).

The water vapor (steam) mixed with dry air in the atmosphere is known as humidity.

Relative humidity is defined as the ratio of the partial pressure of water vapor in the air to the pressure which saturated water vapor exerts at the temperature of the air.

Kohl's sensor for measuring relative humidity utilizes "nonporous material having adsorbing characteristics." He stated (Col. 1) that "materials which have been found to possess excellent adsorbing characteristics, with the exception of their respective resistance ranges for 10 to 100% relative humidity, are quartz (single crystal), fused quartz (poly crystalline) and glass (high silica content i.e. 96% silica and over)." He continues "the above-mentioned materials have a relatively smooth surface. However, it has been found that by roughening that surface which is to be used for measuring humidity the resistance range is appreciably lowered, that is lowered enough to bring it within limits of practical utility."

It would appear that roughening the adsorbing surface will allow the vapor molecules to adhere more readily and thereby develop sufficient resistance sensitivity to enable the electrodes to detect over a broad range of vapor conditions. These conditions are indicated in Kohl to be from 10% to 100% relative humidity. The applicant maintains that he is only concerned with a sensor "to determine the formation of a water film on the glass plate." From this analysis we conclude that as the relative humidity increases, the number of molecules adhering to the surface increase until the dew point is reached, at which time drops of moisture become visible. Consequently the measurement of relative humidity envisaged by Kohl from 10 to 100%, and the measurement of water film, as envisaged by the applicant, both utilize the change in resistance due to water film thickness. We see no difference in the formation of the "water film" pools of the applicant's arrangement from the formation of the "water film" pools in Kohl.

Further the applicant states that he uses a moisture detecting sensitivity amplifying region on his "plate glass" surface. This is prepared by a "sand blast method" or by "imparting a hydrophylic property by coating." He argues that this is different than Kohl, who uses fine grinding with #500 grit. In Column 4, line 36, Kohl also specifies that roughness can be obtained by acid etching. In our view roughening of the surface is to increase its molecular attraction, and it is immaterial whether this is attained by sand blasting or fine grinding, since both enhance the formation of a water film by reducing the surface tension of the water.

On page 3 of the applicant's letter dated June 11, 1976, it is stated: "... that by specifying high silica glass as a suitable material, normal plate glass which forms the defogging glass plate of conflict C1 is not such a material having adsorbing characteristics suitable for forming the substrate of the device of Kohl and therefore the teachings with regard to such a relative humidity sensor as set forth in Kohl have no relevance to the invention set forth in conflict claim C1."



We find that Kohl, in column 1, line 26, does specify glass (96% silica or over) comparable to the plate glass used by the applicant. Therefore we do not see how the adsorbing material used by the applicant acts differently from the adsorbing material indicated in Kohl.

On page 7 of the disclosure the applicant states that the "maximum electrical resistance for the sensor for detecting moisture can be selected in the range of 100,000 ohms to 10,000,000 ohms." Figure 10 of Kohl shows the range of finely ground  $\text{SiO}_2$  to be from 100,000 ohms to 1,000,000,000 ohms. Since there is a broad range of resistance values as the relative humidity changes, there would be no problem in selecting any desired value to actuate a heating circuit whether it is relative humidity below the dew point as in Kohl, or above 100 percent humidity as intended by the applicant.

It is true that Kohl is silent as to the gap between the electrodes, but since the resistance values obtained are similar to that of the applicant it is a fair assumption that the required electrode gap would be similar to that used by the applicant.

Therefore, we conclude that the sensor arrangement used by Kohl is not a different device from the moisture detecting sensitivity amplifying region of the applicant. In Niagara Wire Weaving Co. vs Johnson Wire Works Ltd. 1939 Ex. C.R. at 273 Maclean J. stated that, "small variations from, or slight modifications of, current standards of construction, in an old art, rarely are indicative of invention; they are obvious improvements resulting from experiences, and the changing requirements of users." Claim C1 therefore, in our view, fails to recite a patentable advance in the art.

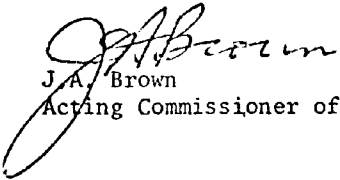
Dependent claims C2 and C3 which specify sand blasting and the application of hydrophylic material to the glass plate do not make a patentable combination over what was recited in refused claim C1.

The Board recommends that the decision of the examiner to refuse claims C<sub>1</sub>, C<sub>2</sub> and C<sub>3</sub> as lacking patentable subject matter be affirmed.



Gordon Asher  
Chairman  
Patent Appeal Board

I have reviewed the findings of the Patent Appeal Board and agree that Claims C<sub>1</sub> to C<sub>3</sub> inclusive should be refused. The applicant has six months within which to remove those claims or to appeal under Section 44 of the Patent Act.



J.A. Brown  
Acting Commissioner of Patents

Dated at Hull, Quebec  
this 14th day of July, 1976

Agent for Applicant

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