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(54) Fog warning device.

(57) A device for providing a warning, for example to motorists, when the relative humidity of the atmosphere is approaching a level at which fog may occur, comprises an instrument capable of measuring the relative humidity of the atmosphere, or an associated quantity such as the dew-point, and an indicator or alarm which provides an audible or visual indicator or alarm when the relative humidity is within a predetermined range of 100%.

EP 0 441 613 A2

FOG WARNING DEVICE

THIS INVENTION relates to a device for giving, for example to motorists, a visual and/or audible warning of the likelihood of fog or mist.

The occurrence of fog or mist is obviously a hazard affecting travel by road, water or air. Fog or mist occurs when air is fully saturated with water vapour. Any cooling of air saturated with water vapour will result in an excess of water in the air, with the possibility of the excess water being released as dew or mist or fog. In humidity terms this would be at 100% r.h., or dewpoint or saturation point.

As is well known, local variations in air temperature or humidity may lead, in certain weather conditions, to fog occurring in patches, a condition particularly hazardous for motor transport since vehicles moving at high speed in conditions of acceptable visibility may suddenly enter fog patches within which visibility is far less than would be necessary for safe driving so that accidents may well occur before drivers have been able to slow to speeds appropriate to the conditions of poor visibility they suddenly find themselves in.

It is an object of the invention to provide a device that continuously measures atmospheric humidity and can give a warning when the occurrence of fog is likely.

Whilst it is envisaged that a device embodying the invention will primarily be of utility in road transport, for example in cars and lorries, such a device may also be useful in rail travel or in sea and air travel, where monitoring of weather conditions is generally conducted more carefully and with greater sophistication than in road transport.

Embodiments of the invention are described below by way of example with reference to the accompanying drawings, in which :-

Figure 1 is a schematic illustration of one form of device embodying the invention,

Figures 2 and 3 show different displays which may be used in devices embodying the invention,

Figure 4 is a perspective view of a yet further instrument embodying the invention, and

Figures 4a and 4b illustrate, under different conditions, a display of yet another device embodying the invention.

Devices embodying the invention comprise a humidity sensor of some sort and a visual or audible alarm or indicator device arranged to provide a visual or audible warning when the relative humidity of the atmosphere, as sensed by the sensor, is within a given range of saturation, for example in the range of 90% to 100% relative humidity (r.h.) Preferably the device is arranged to indicate in which of a plurality of subranges within that predetermined range the sensed relative humidity lies. The device, in the form intended for motorists will, of course, be arranged to present the respective information in a form appropriate to technically unsophisticated persons. Thus, for example, the alarm device may have visual indicators, for the various sub-ranges, labelled with wording such as "fog likely" ; "fog very likely" and "fog imminent".

The measurement of relative humidity can be made in a number of ways. Thus, any of a number of known types of humidity sensor facility can, in accordance with the invention, be used in conjunction with a visual display and/or an audible indicator or alarm, to provide a warning at say, 90-99% r.h. It will be understood that the probability of the relative humidity reading 100% within a short time is much higher if the actual relative humidity is over 90%, than if the actual relative humidity is, for example, 50%.

The device may, of course, sense some other quantity directly related to relative humidity, such as the dewpoint. Thus it is known that if a polished surface is cooled, dew will appear on that surface at a temperature referred to as the dewpoint (which is the temperature at which the atmosphere in the vicinity of that surface will be fully saturated with water vapour, i.e. will be at 100% r.h.). The difference between the ambient temperature and the dewpoint is, of course, smaller the higher the r.h. of the atmosphere so that this difference is also an indicator of how close conditions are to the occurrence of fog or mist. For example, if the dewpoint is only 1°C lower than the ambient temperature, the likelihood of the air cooling further by 1°C causing fog is great and, indeed, much greater than if the dewpoint temperature was 10°C below the ambient temperature.

Whatever the technique used to determine how humid the ambient atmosphere is, the device can be made to display the warning signals in a multitude of ways.

Thus, for example, as illustrated in Figure 1, the device may include a display panel having three lamps, indicated at 10, 11 and 12, labelled as indicated in the Figure to indicate respectively that conditions are approaching those at which fog may occur, that conditions are even closer to the occurrence of fog and that conditions are such that fog may be encountered at any instant, the lamps 10, 11 and 12 being illuminated, for example, when the sensed relative humidity reaches 90% r.h., 95% r.h. and 99% r.h. respectively or when associated quantities being sensed pass corresponding limits.

Alternatively, as illustrated in Figure 2, an alpha-numeric display, for example a liquid crystal or LED display might be arranged to present corresponding warnings in alpha-numeric form, as stationary or moving text. Alternatively, the device may be arranged to

display in analogue or digital form the quantitative difference between the sensed relative humidity and 100% r.h. or between the sensed ambient temperature and the sensed dewpoint. Thus a digital display might be adopted, for example, as illustrated in Figure 2 or alternatively an analogue display, in the form of a needle moving over a scale, can be utilised, as illustrated in Figure 3.

As illustrated in Figure 4, the sensor and other parts of the instrument, including the alarm or display, may be incorporated in a unitary portable package, although, of course, in this case, for the instrument to operate reliably, it will be necessary for the complete package to be exposed to the ambient temperature and humidity conditions. Thus, for example, if the package were intended to be mounted on a motor vehicle, it would be necessary to arrange the package outside the cabin space of the vehicle, for example, as an attachment to an external driving mirror or other suitable mounting point. Thus, it will generally be preferred to construct the device as two packages, one comprising the sensor or sensors and the other comprising the remainder of the instrument, the two packages being detachably connectable by a flexible lead so that the sensor or sensors can be mounted remotely from the display so that, for example, in the case of a device for a motor vehicle, a humidity sensor might be mounted outside the vehicle cabin with the display being secured to the dashboard within the vehicle cabin, or, conceivably, a humidity sensor or dewpoint determining device might be located within the cabin with an external temperature probe being provided to sense the ambient temperature, the device incorporating the necessary circuitry to calculate, on the basis of the data thereby derived, the proximity to 100% r.h. in the ambient atmosphere. Likewise, where the device is to be used in a boat, the sensor could be located on the mast of the boat with the visual display in the cockpit by the helm.

In some embodiments, the device may be arranged to be sensitive to the trend in variation in relative humidity so that, for example, the device may be arranged to provide additionally an indication of the rate of increase in r.h. towards the 100% level and/or to provide an alarm signal at a lower r.h. for a rapidly increasing r.h. than for a more slowly increasing r.h.

Figures 4a and 4b illustrate under different conditions a display of a device embodying the invention and which is arranged to provide a visual indication of the variation in relative humidity, over an extended period, whereby the user of the device can ascertain, at a glance, not only the current relative humidity but also the relative humidity at each of a number of preceding intervals. Accordingly, the user is able to gauge with reasonable accuracy the likelihood that fog will occur within a given time.

By way of example, and referring to Figures 4a and 4b, the display may take the form of a series of vertically oriented bar displays, e.g. LED bar displays, arranged side by side as illustrated so as to define a graph in which relative humidity is plotted on the Y-axis and time on the X-axis so that the greater the illuminated height of any bar on the chart, the greater the r.h. represented thereby, and so that for example, the bar furthest to the right represents the currently sensed relative humidity, the next bar to the left represents the relative humidity sensed ten minutes ago, the next bar to the left represents the relative humidity sensed twenty minutes ago, and so on. The apparatus is arranged to up-date the display continually, so that, for example, at the end of each ten minute interval, the previous indication of each bar is transferred to the bar immediately on the left, whilst a freshly sampled r.h. is indicated by the bar on the extreme right. The device is, of course, provided with appropriate electronic processing and memory circuitry to enable it to function in the manner indicated and to store the values of r.h. previously sampled.

The time interval between samples may be selected in accordance with the particular application of the device, so that the time period represented by the whole chart may be, for example, from one to five hours. The time interval between successive samples of the r.h. may, of course, be substantially less than the time interval represented between adjacent bars of the display, with a consequentially increased memory requirement for the device, so that, for example, whilst each bar is updated once per minute it may take ten successive update cycles for an r.h. value represented in one bar to be represented in the bar immediately to its left.

Considering Figures 4(a) and 4(b), Figure 4(a) illustrates a situation in which r.h. has been increasing over a period and in which the occurrence of fog is imminent, whereas Figure 4(b) illustrates a situation in which r.h. has been decreasing over a period and in which the likelihood of fog occurring is decreasing.

The device of Figures 4(a) and 4(b) may have some additional visual or audible alarm facility, but need not have such additional alarm facility.

The device may also be arranged, additionally, to measure temperature directly and to apply a "correction factor" to the display, or to the underlying computational process according to the rate of change of temperature. Thus, a rapidly falling temperature implies an increased likelihood of fog occurring, and since it is technically easier to track accurately rapidly changing temperature than rapidly changing relative humidity per se, monitoring rate of temperature change may afford an earlier warning of the risk of fog. Similarly, in other embodiments, rate of change of temperature may be used to provide a "correction factor" in the calculation process or algorithm determining the operation of the alarm or other indicator of fog risk.

The features disclosed in the foregoing descrip-

tion, in the following claims and/or in the accompanying drawings may, both separately and in any combination thereof, be material for realsing the invention in diverse forms thereof.

Claims

1. A warning device for providing a warning, for example to motorists, when the relative humidity of the atmosphere is approaching a level at which fog may occur, the device comprising an instrument capable of measuring the relative humidity or an associated quantity and indicator or alarm means arranged to provide an audible or visual indicator or alarm when the relative humidity is within a predetermined range of 100%.

2. A warning device according to claim 1 which is arranged to indicate within which of a plurality of subranges within said predetermined range the actual relative humidity lies.

3. A warning device according to claim 2 wherein the device incorporates a display with a plurality of indicators arranged to be activated progressively, one by one, as the relative humidity, within said range, approaches 100%.

4. A warning device according to claim 1 wherein the device incorporates a scale with an analog indicator arranged to progress over said scale as the relative humidity, within said range, approaches 100%.

5. A warning device according to claim 1, incorporating a digital display for providing a visual indication of the relative humidity within said range.

Fig.1.

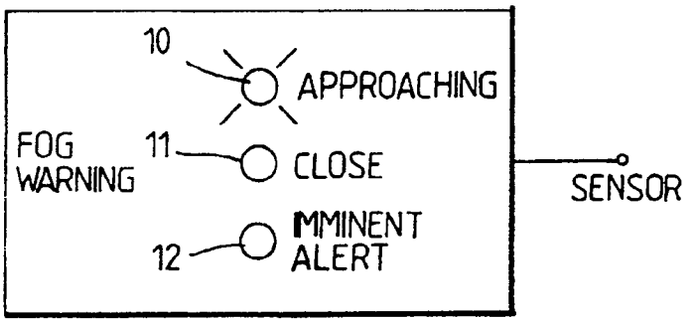

Fig.2.

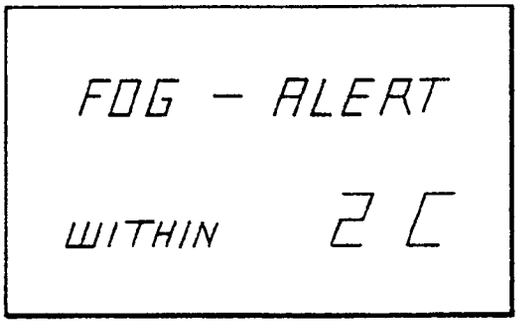

Fig.3.

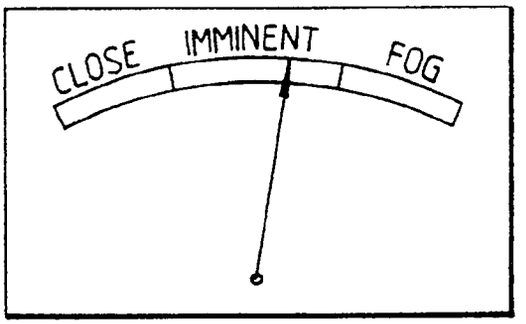

Fig.4.

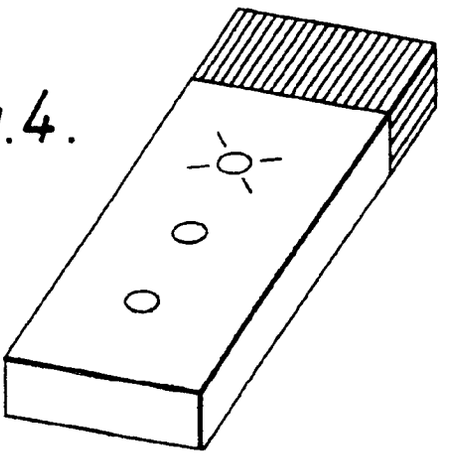

Fig.4a.

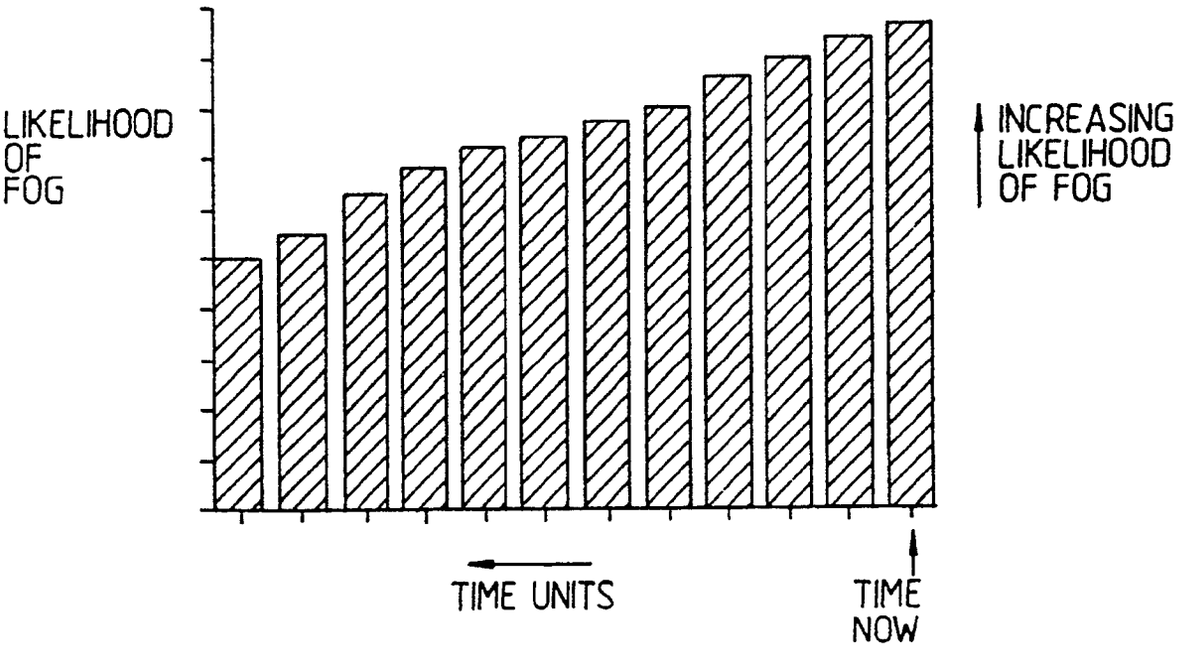
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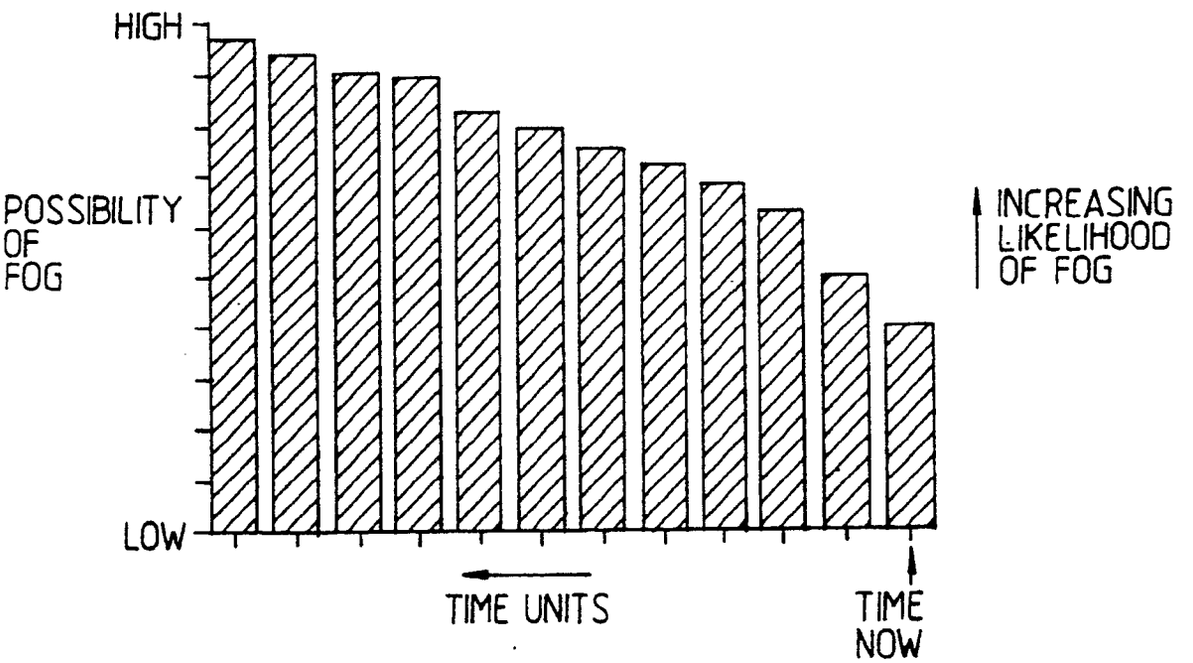
Fig.4b.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