

below, where a dial and index shows the amount of exhaustion in the floating chamber of the gasometer, or in other words the velocity of the wind, according to the law referred to in Hagemann's paper.

91. This apparatus has now been at work some weeks, and has furnished very satisfactory results; the movements of the index are steady, making gentle sweeps around the dial with the lighter winds, and bold and rapid ones in the strong gusts of a high wind. The steadiness of its action will render making it self-registering an easy task.

From observations made with a dial roughly graduated to millimetres water-pressure and miles per hour, its indications appear to agree very closely with the Robinson anemograph, but of course all the rapid variations of velocity lost in the Robinson are plainly observable in this apparatus. I am so well satisfied with this form of anemometer that I have had constructed a more perfect dial and index movement and carefully made spring than at first used, and propose to make it self-registering by means of a lever marking on a drum covered with smoked paper.*

Shade Temperature.

92. In regard to the experiments on shade temperature, Mr. Ellery mentioned that, during the erection of the shed, experiments were made with side-screens, which made a very great difference in the readings, the thermometer, as soon as the current of air was stopped, showing an elevation of temperature to the extent of 4° or 5°

Swinging Thermometers.

93. Dr. Hector inquired whether in swinging thermometers the shape of the bulb had been observed to modify the results. Mr. Ellery replied that he had found that the shoulder bulbs always registered too low when swung, although when placed upon the stand they read correctly

94. Dr. Hector remarked that this coincided with his experience, and had led him to discard the shoulder bulb for the form in which the bulb was of the same diameter with the stem.

Evaporation.

95. Mr. Ellery stated that he had for many years adopted only one system of measuring spontaneous evaporation—namely, that of a tank level with the surface of the ground. The height of the surface in this tank was measured every morning at 9 a.m.

Black-Bulb Thermometers.

96. Some years ago he made experiments upon black-bulb thermometers, the results of which were given in a paper read before the Royal Society of Victoria, and showed that, while the thermometer registered correctly up to about 125° or 130°, at temperatures over 125°, even with the best instruments, variations appeared amounting sometimes to 16°. The experiments were made in a room by means of dark radiation from a heated copper surface, within about three feet of which the thermometers were placed.

97. Dr. Hector inquired whether, after such an experiment, the thermometer returned to its normal registration. Mr. Ellery replied in the affirmative: the instruments acted quite correctly when placed in hot water; the variations appeared to result from variations in the diathermancy of the glass. His opinion was that not the slightest confidence was to be placed in black-bulb thermometers at temperatures over about 130°

98. Dr. Hector stated that he had found that after 130° had been reached these thermometers radiated heat from the back at a very different rate from that at lower temperatures. He considered that the back should always be in contact with a substance of the same nature and the same colour. When the back was covered with a white cambric handkerchief, he obtained higher readings than when any other material was used, while contact with black substances, such as black wool, gave quite different results. The highest readings had always been got when white substances were used, though these were not reflecting substances. It would appear that after attaining a certain temperature the material of the instrument was altered in its power of dispersive radiation; in other words the curve of dispersive radiation did not coincide with the curve of absorptive radiation.

99. Mr. Ellery suggested that the difficulty might be got over by using a bulb one half of which was blackened and the other half left bright.

100. Mr. Todd said that, in comparing a thermometer whose bulb was lampblackened with one whose bulb was of black glass, he found that the greatest difference appeared between them when the sun suddenly shone out upon them. The lampblackened thermometer then showed sometimes as much as 13° higher than the black glass.

101. Mr. Russell said that he had observed similar facts to those reported by Mr. Todd. He remarked that the difficulty with the black bulb was to know the exact amount of vacuum in the tube. Those instruments which he had lately got were provided with an electric contact to test the vacuum.

102. Mr. Ellery said that the electric indications of the nature of the vacuum varied with the purity of the air and other circumstances, and that probably observers would have to revert to Pouillet's or some other of the old forms.

Anemometer.

103. Mr. Russell suggested that, pending the solution of the best method of determining the velocity of the wind, the form of hand anemometer now laid upon the table by him should be used at first-class stations. He had ordered twelve of these instruments from London, at a cost of 15s. each. He explained the mode of using the anemometer, which was to be held in the hand, and gave the velocity and pressure of the wind for two minutes at each experiment.

Discussion ensued.

* This apparatus has since been completed, and is found to work extremely well. The pressure or velocity of gusts of wind is easily measured off from the smoked-paper curves, while a mean curve will give the velocity for any period.—E.L.J.E.