ciently remote from all trees to avoid an error from this source.

"Before the first snowfall, place on the ground a sheet of very thin board—plaster board or beaver board answers well. On the upper surface there should be secured by thumb tacks at the corners a sheet of white cloth with a rough surface—white flannel is good. The position of the board may be marked by two or three stiff wires stuck into the ground at a little distance from the board. When the first snowfall comes, a special snow can, described above, may be inverted over the cloth and pressed down firmly, rotating it slowly as it is pressed down. Then the remaining snow should be brushed off from the cloth, the board lifted, at the same time lifting and inverting the can with the board over its mouth. * * *.

"After a measurement the flannel cloth is, if necessary, dried, retacked on the snow board, and the snow board placed on the surface of the newly fallen snow where the snow is undisturbed, the board being pressed down just sufficiently so that the cloth surface is flush with the snow surface. The snow board should be inspected every day whether it snows or not, so as to keep its surface flush with the snow surface at all times.

"The use of the cloth is twofold: (1) It provides a surface with friction conditions much more closely resembling those of snow than could be obtained by the use of the board alone. (2) It provides a surface as nearly as can readily be obtained, equivalent to a snow surface in its capacity to absorb and radiate heat, and so prevents loss by melting when snow falls in relatively warm air."

Snow samplers of another type for measuring mountain accumulations of snow in spring are very useful for estimating a summer water supply.[2]

RAINFALL ON MOUNTAIN SLOPES AS COMPARED WITH THEORETICALLY PERFECT RAINGAGE INDICATIONS.

"There is a matter in connection with the inclination at which rain falls, which is sometimes of great importance, but which seems to have been generally overlooked. If a rain-bearing wind blows against a mountain slope, then the amount of rain falling on the mountain slope will generally be greater than the amount which would fall on an equal horizontal projected area and greater than the amount caught or measured by a horizontal rain gage.

"In a similar manner the actual precipitation on the leeward side of the slope may be materially less than indicated by a horizontal rain gage. The southeast slope of the Catskill Mountains in New York State affords an excellent illustration of a case where the actual rainfall is apparently greater than the measured amount. The average slope of the mountain side is about 30°. If the rain is blown against this slope at an angle of 15° to the vertical, then the actual precipitation on the projected area would be 1.16 times the amount measured by a horizontal raingage.

"If the run-off of a stream for the winter period, November to April, inclusive, is compared with the measured precipitation for the same period, it will sometimes be found that the measured run-off is the greater. However, the ground water and surface storage is usually larger at the end than at the beginning of the winter period, so that the measured run-off will usually represent less than the total available water supply."—*C. F. B.*

[2] A discussion of these is planned for a later issue of the REVIEW.—ED.

DISCUSSION.

Ever since, and in all probability before, the famous comparisons at Rothamsted, it has been evident, assuming that accurate serviceable instruments are used (and at present there is no valid excuse for considering any other kind), that the only important errors in records of precipitation are due to bad exposure and faulty methods of observation. The six different kinds of errors referred to by Mr. Horton are found in these two classes.

Some differences between gages under comparison can not be explained, but apparently if there are important differences between gages of different sizes they would have appeared somewhere in comparisons that have included the 0.001-acre gage, whose area is nearly 4 square meters, and the smaller ones having an area a thousand times smaller.

Comparisons of several patterns of gages at Blue Hill Observatory during a long period of time indicate that:

(1) Gages fitted with a Nipher screen made of wire cloth and having a diameter of at least twice that of the funnel are more efficient than unshielded gages during high winds.

(2) Apparently the best possible conditions are obtained when gages shielded in this way are placed with their funnels about 0.3 meter above the ground and inside an inclosure whose walls are composed of coarse wire cloth and placed at a distance from the gages equal to about twice their height.

Personal experience with various methods of measuring snow indicates that:

(1) Cylindrical "catch" gages, of which the length of the funnel is greater than one-third its diameter, should under no circumstances be used for measuring snow.

(2) The only moderately satisfactory "catch" gage has a very short funnel terminating in a receiver at least twice as large as the funnel and fitted with a Nipher screen as already described.

(3) It is best that "catch" gages for snow, particularly where an appreciable interval of time occurs between the end of the storm and measurement, should be made self-recording, for then it is possible to allow for evaporation and drifting due to increase or change of wind. Records from such instruments supplemented by surveys with samplers should yield more accurate information concerning the amount, rate, and duration of snowfall than is available with means in use at present. For use in sparsely settled regions it is easily possible now to produce gages of this kind capable of running several months with one winding of the clock.—*S. P. Fergusson.*