some sunshine may be lost near sunrise or sunset in the winter because there is no card to receive it. The part projecting above the horizon in summer will partly shadow the globe, and faint sunshine may be lost, for at most only half the globe can be solarized at sunset. But the loss due to this cause is unimportant. Stokes designed the complete belt to use successively three cards of different shape for different times of the year. The equinoctial card forms a portion of a cylinder round the polar axis for spring and autumn, the summer card and the winter card each forms a part of a cone making a vertical angle of 16° with the polar axis as indicated in fig. 3.

*Adjustments.—*The adjustments of the instrument are to set the belt so that its axis is parallel to the polar axis and symmetrically adjusted with reference to the meridian of the place, and to set the sphere so that its centre coin­cides precisely with the centre of the belt. No one of the three adjustments is easy to make or to test because neither the centre of the sphere nor the centre (nor indeed the axis) of the belt can be easily identified. For an instrument for testing these adjustments see *Quart. Journ. Roy. Met. Soc.* xxxii. 249.

Instruments differ accord­ing to the means provided for mounting or adjusting the positions of the belt or sphere, and in that known as the Whipple Casella instrument the fixed belt is replaced by a movable card holder. The chief advantage of Stokes's specification is the simplicity of the use of the instrument when once it has been properly adjusted and fixed.

It is essential that the glass sphere should be of the proper size and refractive index to give an image of the sun on the prepared card or within the 20th of an inch of it nearer the centre. It is also essential that the cards used should not only be of suitable material but also of the right dimensions for the bowl. The colour and material of the cards were selected by Stokes in consultation with Warren De la Rue, who was at that time his col­league on the Meteorological Council, and the cards used by the meteoro­logical office are still supplied by Messrs De la Rue & Co. Accuracy in the comparative measurements of sun­shine by this method depends upon the proper adjustment of the dimen­sions of the different constituent parts of the recorder and accordingly the following specification of standard dimensions has been adopted by the meteorological office.

*The Time Scale.*—On the time scale of the equinoctial card twelve hours are represented by 9∙00 in.

*The Bowl.—The* diameter of thc bowl, measured between the centres of thc 6 o’clock marks on a metal equi­noctial card of thickness 0·02 in. when in its place, is to be 5∙73 in. ( = 0∙01 in.). The distance between the exposure edges of the upper winter flange and the lower summer flange must not be less than 2·45 in., nor exceed 2∙50 in. The distances from the middle line on the equinoctial card to the middle lines on the summer and winter cards arc to be 0∙70 in. ( = 0∙02 in.). The inclination of the summer card, in place, to the winter card, in place, is to be 32° = 1/2°, symmetrically arranged with regard to the equinoctial card. the section of the supporting surface by a plane through the polar axis is to be as in fig. 3.

*The Sphere.*—The material for the sphere must be “ crown ” glass, colourless, or of a very pale yellow tint. The diameter 4 in. The weight between 2∙92 and 3∙02 ib. The focal length from the centre of the sphere to the geometrical focus for parallel rays should be between 2∙96 in. and 2∙99 in.

*Measurement of the Sunshine Record.—*It was mentioned that the Campbell-Stokes recorder involves a conventional definition of sunshine. The recorded day of sunshine is less than the actual time during which the sun is above the horizon by about twenty minutes at sunrise and sunset on account of the want of burning power of a very low sun. Some further convention is necessary in order to obtain a tabulation of the records which will serve as the basis of a comparison of results for climato­logical purposes. the spot which is scorched on the card by the sun is not quite limited to the image of the sun, and a few seconds of really strong sunshine will produce a circular burn which is hardly distinguishable in size from that of a minute’s record. (See fig. 4.) Consequently with intermittent sunshine exaggera­tion of the actual duration of burning is very probable. Strictly speaking measurements ought to be between the diameters of the circular ends of the burns, but the practice of measuring all the trace that can be distinctly recognized as scorched has become almost universal in Great Britain, and appears to give a working basis of comparisons.

*Other Types of Sunshine Recorder.—*There are, however, various other conventions as to sunshine which are used as the basis of recorders of quite different types. The Jordan recorder uses ferro­cyanide paper and the sun keeps the time of its own record by the traverse of a spot of light over the sensitive paper, arranged as a cylinder about a line parallel to the polar axis. The effect thereby recorded is a photochemical one, and the composite character of the sun's radiation, modified by the elective absorption of the atmosphere makes the relation of the record to that of the sun’s scorching power dependent upon atmospheric conditions and therefore on different occasions, so that the two records give different aspects of the solar influence. Other recorders use the thermal or photographic effect