10.3.2.1.9 Mountings of spectral apparatus

An autocollimation spectral apparatus with at least one reflecting (30°) prism as dispersive element and a lens or a mirror as objective element is a *Littrow prism mounting*. If a separate mirror is used, it is a *Wadsworth prism mounting*. A combination of prisms can be arranged to provide a *constant deviation mounting*.

A mounting with a concave mirror as imaging element of the entrance collimator and with a concave grating acting at the same time as dispersive element and as imaging element (at normal angle of diffraction) of the exit collimator is called the *Wadsworth mounting* (Fig. 10.8). This *concave grating mounting* is used because of its stigmatic imaging properties.

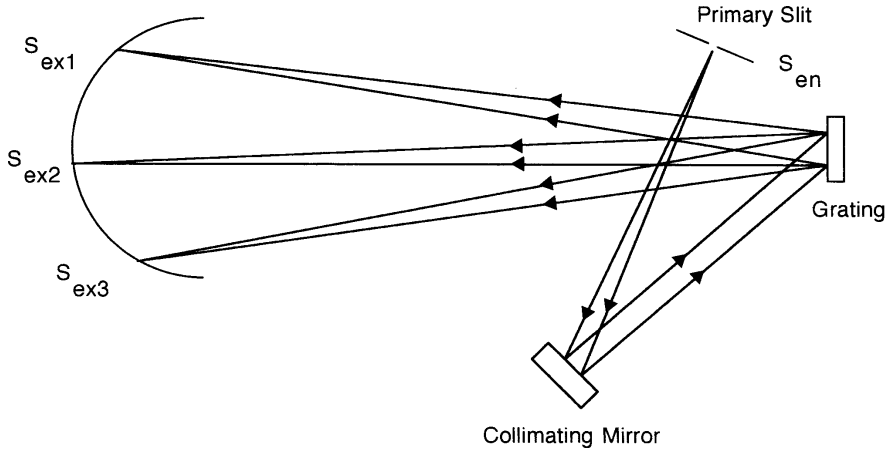

Fig. 10.8 Wadsworth Mounting

A mounting in which entrance and exit collimators are fixed at an angle of about 70° and in which wavelength variation is effected by rotation of the grating is called the *Seya-Namioka mounting* (Fig. 10.9). It is mainly used in the vacuum UV region.

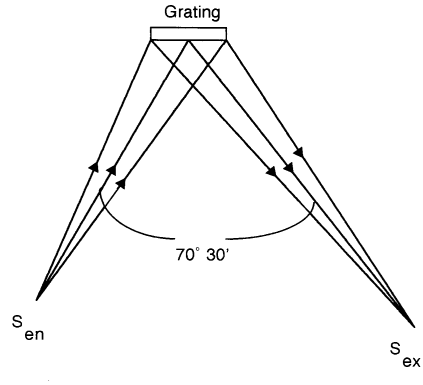

Fig. 10.9 Seya Namioka Mounting

A normal incidence mounting, where for wavelength adjustment the grating is rotated and transported along the bisector of the angle subtended by the entrance and exit axis is called the *Robin mounting*.

A mounting of a specifically corrected interferometric grating or *flat-field grating*, where for a considerable length of the spectrum a focal plane is obtained, is called a *flat field mounting*.

A *Rowland circle mounting* is one where a spherical concave grating with a radius of curvature R is mounted on the perimeter of a real or imaginary circle with a diameter equal to R. The lines of the grating are normal to the plane of the circle and the radius of the grating sphere passes through the centre of the circle. An entrance slit positioned on the Rowland circle produces a focussed spectrum on the Rowland circle. The spectral lines are astigmatic.

A Rowland circle mounting, in which entrance slit and grating are fixed on the Rowland circle is termed the *Paschen-Runge mounting*. Photographic plates, film holders or exit slits are also attached to the circle (Fig. 10.10).

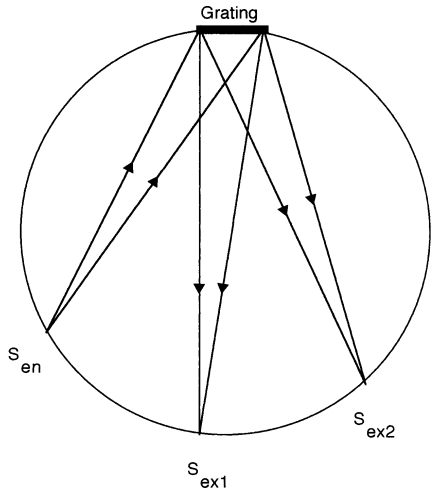

Fig. 10.10 Paschen-Runge Mounting

A Rowland circle mounting near autocollimation is termed the *Eagle mounting*. It is suitable for e.g. vacuum instruments. If the entrance slit is located side by side with the camera or exit slit, it is called the *in-plane Eagle mounting*. If they are symmetrically placed above or below the plane of the Rowland circle, it is called the *off-plane Eagle mounting*.

A *grazing incidence mounting* is a Rowland circle mounting for the wavelength region below 100 nm, in which use is made of the high reflection near total reflection of the incident beam. Angles of incidence and diffraction are very large and of opposite sign.

A *plane grating mounting* with one concave mirror acting as imaging element symmetrically for both the entrance and the exit collimator is an *Ebert mounting*. It is also called an *in-plane Ebert mounting*.

A similar mounting, but in which entrance and exit slits or the middle of the camera are displaced symmetrically in the direction of the grating grooves is called the *Fastie-Ebert mounting* or *off-plane Ebert mounting*.

A mounting similar to the in-plane Ebert mounting, but with separate mirror for entrance and exit collimators is called the *Czerny-Turner mounting* (Fig. 10.11).

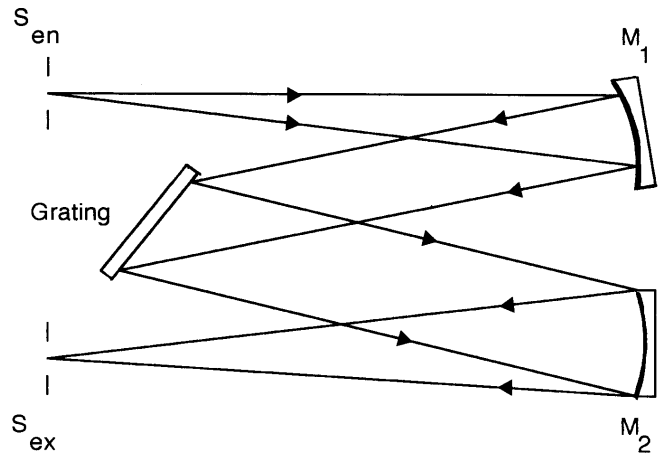

Fig.10.11 Czerny-Turner Mounting

An *echelle grating spectral apparatus* is a plane grating spectrograph, monochromator or polychromator with an *echelle grating* as dispersive element. Frequently, a pre- or post-disperser for order selection or order sorting is fully integrated. According to the chosen combination and its intended use, it is called an *echelle spectrograph, echelle spectrometer, echelle monochromator* or *echelle polychromator*.