The Great Melbourne Telescope Project

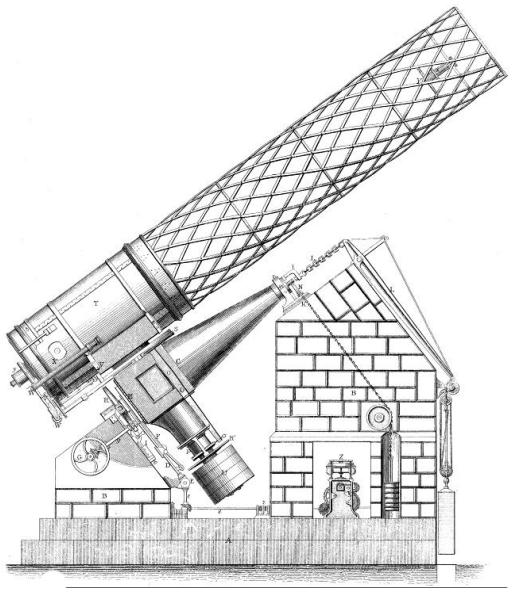
A Joint Venture by Museum Victoria, The Royal Botanic Gardens and the Astronomical Society of Victoria

2. The Great Melbourne Telescope's Mechanical Innovations Part -1

The order for the Great Melbourne Telescope (GMT) was placed with Thomas Grubb of Dublin in February 1866 and the telescope was completed two years later. The GMT incorporated a number of technical innovations that Grubb had used on previous telescopes and others that were completely new.

Lattice Tube Construction

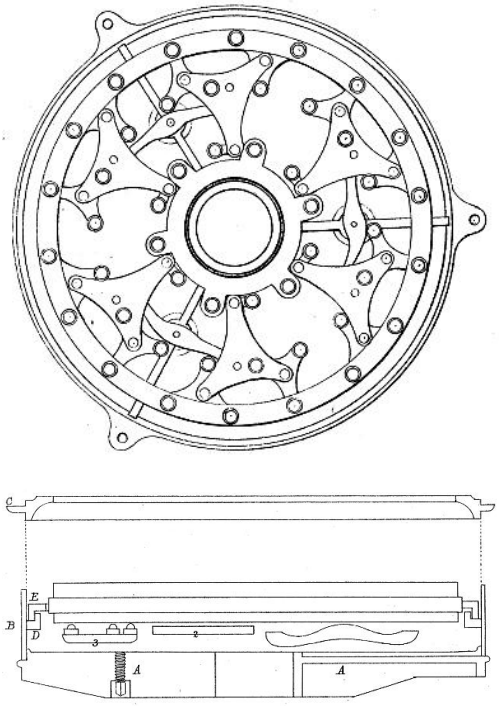
The tube of the GMT consists of two parts. The lower section 7-ft in length made from "strong sheet iron." The 21-ft long upper lattice section is made of two sets of steel strips $^1/_6$ inch thick, 3 inches broad at the bottom and tapering to 1½ inches at the top. One set of strips was wound clockwise around a cylindrical form, the other anticlockwise. Where the strips crossed each other, each crossing was secured with a rivet making a series of lozenges measuring 9 inches by 17 inches. Four strong diaphragms were inserted at equal distances in the interior of the lattice section. This made the tube both lightweight and extremely stiff. When a mass of 112lb (51kg) was hung on the far end of the tube section, the total deflection was measured at 1/200 inch (0.127mm.) It is interesting to note that in 1927 the British airship R100 and the World War II Vickers Wellington bomber used a similar "geodesic" lattice construction. Both were designed by Barnes Wallis. While Wallis is often attributed as the originator of the geodesic lattice type of construction, the GMT preceded the R100 by some 60 years.



The original design drawing of the GMT by Robinson and Grubb.

Mirror Support System

To support the relatively flexible primary speculum mirror (48-inches in diameter and 4-inches thick) Grubb used the "equilibrated lever" system. This technique, which is still used today, relies on an arrangement of counterbalanced flat triangles supported by levers as shown in the drawing on the right. The weight of the mirror is supported on pads located at the corners of the triangles with the dimensions of the triangles and the length of the levers such that each supporting pad carries an equal weight. This method of support was first used in 1834 on Grubb's 15-inch Armagh reflector and later on Lord Rosse's 72-inch reflector completed in 1845.



GMT mirror support system with plan view shown at the top and profile shown above.

The Great Melbourne Telescope Project Information Fact Sheet

This fact sheet is one of a series providing information on the GMT historical background, technical details of the instrument and the efforts to reconstruct this magnificent telescope for use by the public.