

O TELESCÓPIO DE CRAIG (1852)

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O reverendo John Craig (1805-1877) construiu em 1852 um telescópio refractor com 24" (61 cm) de abertura em Wandsworth, próximo de Londres (Figura 1). Apesar de não pertencer a qualquer Associação astronómica, Craig tencionava realizar com este instrumento (o maior refractor existente até ao momento), observações do anél C de Saturno e verificar se o planeta Vénus possuía satélites.

Segundo Henry King (1955)¹ este telescópio refractor "*was a complete failure*". Alguns trabalhos recentes descrevem de um modo pormenorizado este instrumento, dotado de uma montagem azimutal fora do comum² e que foi utilizado unicamente durante um período de 6 anos.

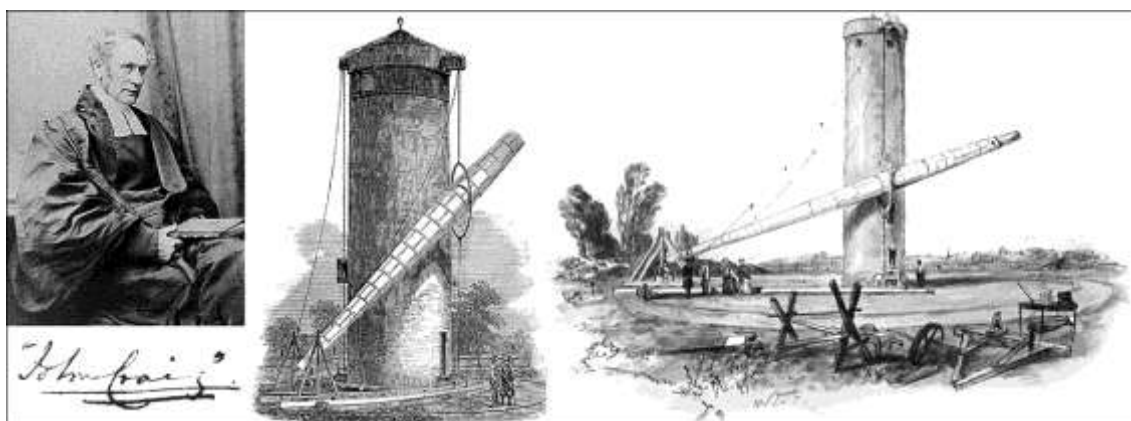


Figura 1- Telescópio de Craig (1852). John Craig (esquerda), gravuras e aguarela (centro e direita).

O telescópio de Craig é descrito na revista *Illustrated London News* em 18 de agosto de 1852:

During the past three months, the construction of a building on Wandsworth Common, for the reception of a monster achromatic telescope, has been rapidly progressing, and is, with telescope itself, now nearly completed. This great work is under the supervision of William Gravatt, Esq., F.R.S., or Rev. Mr. Craig, vicar of Leamington. The site, consisting of two acres, has been liberally presented by Earl Spencer, in perpetuity, or as long as the telescope shall be maintained.

As this gigantic instrument should have some distinctive name, the various friends of science who have been admitted to view it have denominated it 'The Craig Telescope' considering as the Duke of Northumberland's name has been handed down in connection with the Cambridge refractor - so, also, the originator, in fact, of this 85 feet focal length achromatic telescope, with an object-glass of two feet aperture and already capable of doing marvels, should have his name associated with a work completely novel in all its part, and we are happy to add, entirely of English workmanship. All other achromatic telescopes of any pretensions are foreign.

¹ King, H.C. (1955). The history of the telescope. Dover Publications Inc.

² <http://www.craig-telescope.co.uk/>, <http://homepage.ntlworld.com/greg.smyerumsby/craig/>
Steel, D. (1982). The Craig Telescope of 1852. *Sky and Telescope*, 7: 12-13.

The Duke of Northumberland's telescope is foreign, the Oxford telescope is foreign, Sir James South's telescope is foreign, in fact, and these instruments were merely purchased by English money. Not so the present instrument, by far the largest achromatic telescope in the world.

In the retired study of a country clergyman, the idea of this instrument struck him, and having made in his own peculiar way his calculations the result was a fixed determination to carry them out, which he has more especially shown in the choice of his engineer, for many were those he had to reject, after looking into their plans of mounting his telescope. He has selected Wm. Gravatt, Esq., FRS, whose name, we believe, Mr. Craig, is more desirous to connect with his wonderful telescope than his own.

The powers of this Telescope, as a measuring instrument, are unapproachable by all others. It separates minute points of light so distinctly that its space penetrating qualifications will render it, as a discovering instrument, one of a most superior order. It resolves the Milky Way, not simply into beautiful and brilliant 'star dust', to use the language of astronomers, but actually subdivides it into regular constellations. We thus in what at best was heretofore separated into minute points of light, can now behold counterparts of our own Orion and Cassiopeia, our Greater and Lesser Bears and also evidently adorned with the most generous colors.

The Telescope is perfectly achromatic; Saturn exhibits itself with milky-light whiteness. Now that the instrument is adjusted, Mr Craig wishes the Planet Venus to be examined, for he hopes to settle the question as to whether she has a satellite or not, and we need not say what an advantage the solution of this fact would be to science. The moon is a magnificent object and perfectly colorless, so that the observer can behold her mountains and rocks with a vivid distinctness that makes us long for clear weather to bring the whole of the powers of this marvelous instrument to bear upon our planet. On a favorable evening, were such a building, for instance, as Westminster Abbey in the moon, this Telescope would reveal all its parts and proportions.

The central tower is of brick, and 61 feet in height, 15 feet in diameter, and weighs 220 tons. Every precaution has been taken in its construction to prevent the slightest vibration, which can still further be provided for by loading the several floors, and the most perfect steadiness will be thus ensured.

By the side of this sustaining tower hangs the telescope. The length of the main tube, which is somewhat shaped like a cigar, is 76 feet, having an eyepiece at the narrow end, and a dew cap, at the other: the total length in use will be 85 feet. The design of the dew cap is to prevent obscuration by the condensation of moisture, which takes place during the night, when the instrument is most in use.

Its exterior is of bright metal: the interior is painted black. The focal distance will vary from 76 to 85 feet. The tube at its greatest circumference measures 13 feet and this part is about 24 feet from the object-glass. The determination of this point was the result of repeated experiments, and minute and careful calculation. It was essential to the object in view that there should not be the slightest vibration in the instrument, and Mr. Gravatt has made the vibration at one end of the tube neutralize that at the other.

The ironwork of the tube, which is a splendid specimen of English workmanship, was manufactured by Messrs. Rennie, under the direction of Mr. Gravatt. The tube rests upon a light wooden framework with iron wheels attached, and is fitted to a circular iron railway at a distance of 52 feet from the centre of the tower. The chain by which it is lowered is capable of sustaining a weight of fifteen tons, though the weight of the tube is only three.

Notwithstanding the immense size of the instrument, it can move either in azimuth, or up to an altitude of 80 degrees, with as much ease and rapidity as an ordinary telescope, and from the nature of the mechanical arrangements, with far greater certainty as to results. The slightest force applied to the wheel on the iron rail causes the instrument to move round the central tower.

All the optical work has been executed by Mr. F. Slater, of Somer-place West, Euston-square. The two lenses, one of flint and the other of plate glass, are thus used: The plate-glass lens has a positive focal length of 30 feet 11/2 inch; its refractive index is 15103. The flint-glass lens has a negative focal length of

40 feet 10 1/2 inches; and the refractive index of this glass is 16308. These two lenses, placed in contact, are used in combination, and constitute the achromatic object-glass, the focal length of which is 76 feet to parallel rays – that is, to all celestial objects.

John Craig ocupou o cargo de reverendo em Leamington. Era um figura muito respeitada na sua paróquia e trabalhou intensamente para reconstruir a igreja de todos os santos em Leamington. Vistou diversas igrejas na Europa e em 1849, recorrendo a diversas doações, terminou a referida reconstrução. Em 1852 foi construído um novo transecto na referida igreja. A reconstrução da igreja coincidiu com a construção do telescópio. William Gravatt (1806-1866), membro da *Royal Society*, foi responsável pela parte mecânica do telescópio e Thomas Slater (1817-1889) foi encarregue da construção da objectiva.

A motagem do telescópio era constituída por uma torre construída com tijolos que suportava o tubo do telescópio (Figura 1, Figura 2).



Figura 2- Telescópio de Craig: fotografia da época (esquerda) e reconstituição do telescópio (direita), (<http://www.craig-telescope.co.uk/>).

A torre foi construída num período de apenas um mês. Tinha uma altura de 64 pés (19,5 m), um diâmetro de 15 pés (4,6 m) e um peso aproximado de 220 Toneladas. O tubo, em forma de charuto, foi construído a partir de peças metálicas rebitadas, segundo os métodos utilizados na indústria naval da época. Com um comprimento de 85 pés (25,9 m) e um peso aproximado de 3 Toneladas, o tubo não podia atingir altitudes superiores a 75/80 graus ou inferiores a 5 graus (Figura 3).

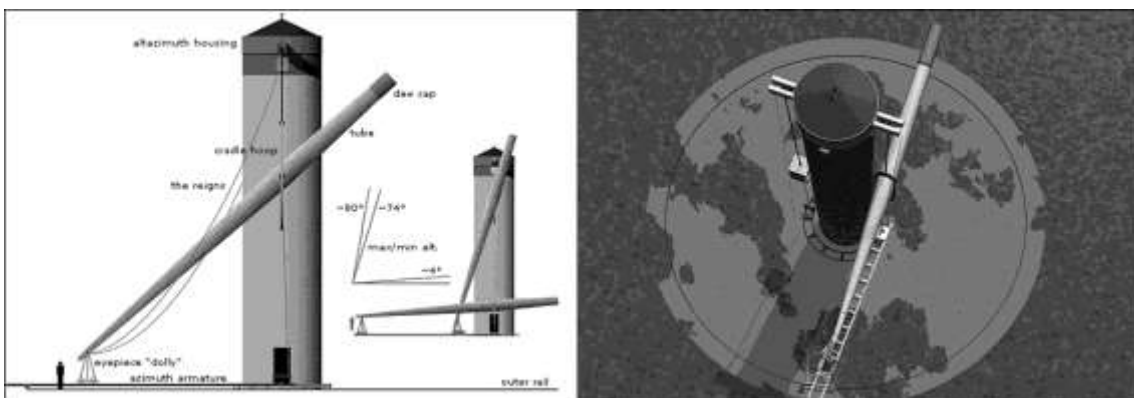


Figura 3- reconstituição do telescópio de Craig ilustrando a altura máxima e mínima por este atingida, (<http://www.craig-telescope.co.uk/>).

O tubo do telescópio podia rodar livremente à volta da torre. Estava suportado por uma corrente fixa a cerca de 24 pés (7,3 m) da extremidade do tubo e provida de um contrapeso. Na extremidade da ocular, o tubo era apoiado por um suporte em madeira provido de rodas (Figura 4).

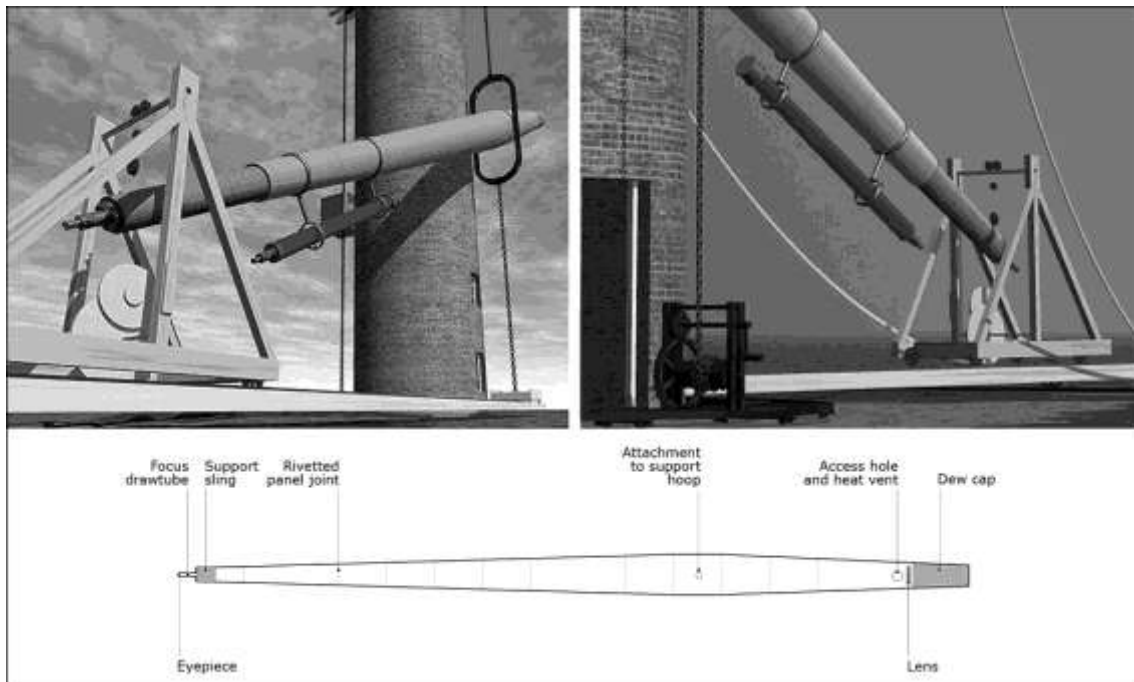


Figura 4- Reconstituição do tubo do telescópio de Craig, (<http://www.craig-telescope.co.uk/>).

O telescópio guia foi igualmente construído por Slater e devia ter uma abertura de 10 a 15 cm (Figura 4).

A objectiva do telescópio de Craig foi construída entre 1850 e 1852. Era constituída por um elemento *flint* fornecido pela firma *Chance Company* e por um elemento em vidro vulgar (*plate glass – Thames Plate Glass Company*). Aparentemente objectiva não era de grande qualidade e necessitava de ser diafragmada para ser utilizada em boas condições (Figura 5).

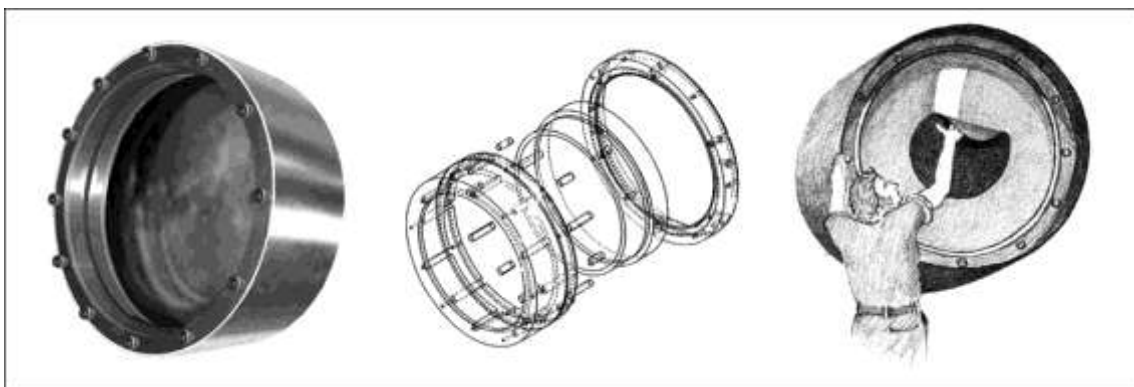


Figura 5- Reconstituição da objectiva de 24 pés do telescópio de Craig.

Um artigo da revista *Illustrated London News* refere-se à fraca qualidade da objectiva:

The Craig Telescope is, in a small portion of one of its lenses, too flat by about the five thousandth part of an inch. This has been stopped out when extreme accuracy of definition is required, as, for instance, in

observing such fine point of an object as Saturn's third ring. To many of our readers it will seem incredible that the five thousandth part of an inch is rendered, as to its results, in any degree evident, and is a quantity that can be positively measured. But so it is.

Este erro representa uma correcção inferior a um comprimento de onda o que é totalmente inaceitável no que diz respeito à prestação de uma objectiva acromática.

O telescópio de Craig foi utilizado apenas entre 1852 e 1858. Durante este período de 6 anos foram realizadas sobretudo observações dos planetas Vénus e Saturno (Figura 6). A revista *Illustrated London News* em 16 de Outubro de 1852, refere a propósito da observação de Saturno:

When news of this reached England, the Northumberland achromatic, at our Cambridge University, was brought to bear, by Professor Challis, on the rings of Saturn, and he failed in discovering the third: so, also, with the giant reflector of the Earl of Rosse. Hence it became a matter of intense interest, as to whether there was in reality a third ring. We are happy now to exhibit an Engraving of the Ring, as seen in this country. In the Craig Telescope - engraved and described in the Illustrated London News for August 28 - this third ring is quite palpable; so that there can be no longer any doubt as to its existence. The colour of this ring is a brilliant slate. The great quantity of light which the telescope at Wandsworth brings to the eye of the observer from this planet gives, we presume. This bright appearance to what in instruments of less power is in fact completely invisible.

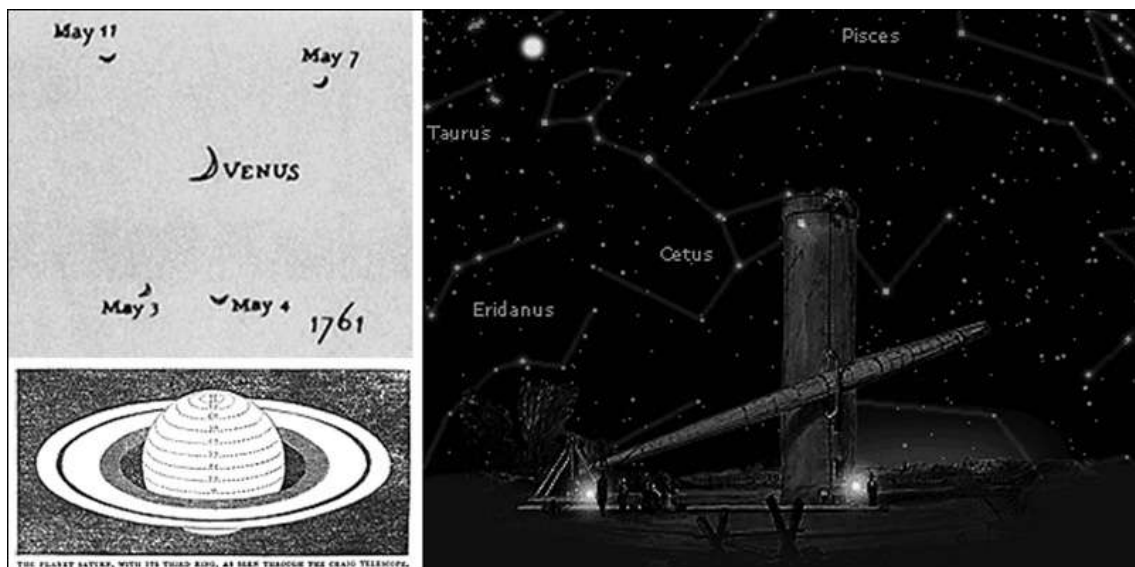


Figura 6- Observação ilusória dos satélites de Vénus efectuada em 1761 por Jacques Leibax Montaigne (1716 - 1785?) e observação do sistema de anéis de Saturno efectuada com o auxílio do telescópio de Craig, (<http://www.craig-telescope.co.uk/>).

Apesar da montagem azimutal do telescópio não ser adequada para a realização de fotografias astronómicas, são feitas referências a imagens obtidas com o auxílio deste instrumento num trabalho apresentado à *British Association* em 1854:

Dr. Diamond, who printed the positive of the moon, found the sun picture, however, rather overdone for transferring. "It will be necessary, therefore, either to use collodion and nitrate of silver simply without any or but little sensitive solution or else pass the sun's rays through some colored glass, which will partially retard their energy. A series of pictures of the spots of the sun, as well as of the general surface, may then be successfully obtained; and hence it is not too much to anticipate some accession to our knowledge of the physical character of both our great luminaries by means of this gigantic telescope, which Dr. Diamond enables me to exhibit photographically to the [Astronomy] section.

O telescópio de Craig foi totalmente desmontado no ano de 1870 (Figura 7). Existe uma referência à observação do cometa de Donati, efectuada em 1858 por Thomas Slater, com o auxílio de um telescópio refractor de 38 cm de abertura, em que é referida a seguinte passagem:

Slater's telescope is the largest refractor at present in use in this kingdom

Este facto parece indicar que o telescópio de Craig já não era utilizado regularmente em 1858.

Hery King (1955) refere ainda:

The crude structure was dismantled after a few years' use, but not before it had formed a strange landmark for the residents of Wandsworth (...)

A melhor descrição do desmantelamento do telescópio é efectuada por Slater na revista *The English Mechanic* em Maio de 1870:

Having recently come to reside in this locality (Clapham Junction), and noticing Mr. Webb's late remarks respecting the great Wandsworth Telescope, I have been induced to try and seek it out. After two or three failures I met near the spot on which it used to stand a gentleman named Stilwell, an inhabitant of Wandsworth, who gave me the following particulars from his own personal knowledge. Pointing out the enclosure within which the instrument was erected, and indicating markings in the ground left by the tower from which it swung, he said that the whole affair was removed four or five years ago. The bricks were employed to aid in the erection of an [sic] hotel visible a few hundred yards off; the tube was bought by a Wandsworth broken [sic], who cut it into sections, and sold them to a gentleman at Wimbledon. These sections with bottoms inverted, formed tanks, from which the gentleman's cattle now drink. About the tramway there was some four tons of wrought iron, which M., Stilwell himself had converted into horse-shoes. As to the object glass, my informant could tell me nothing

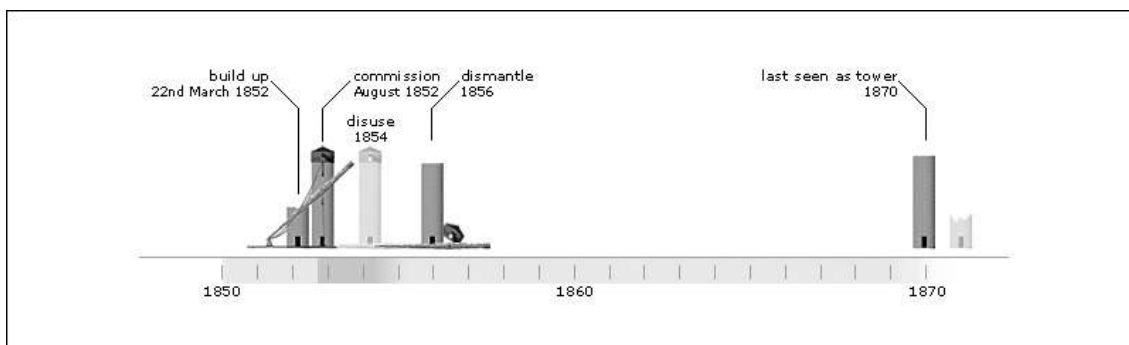


Figura 7- Construção e desmantelamento do telescópio de Craig, (<http://www.craig-telescope.co.uk/>).

Bibliografia:

- King, H.C. (1955). The history of the telescope. Dover Publications Inc.
- The Craig Telescope websites <http://www.craig-telescope.co.uk/>
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