

UNUSUAL TELESCOPES – II

FIXED-EYEPIECE TELESCOPES

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Fixed-eyepiece or stationary-eyepiece telescopes were built since the early 1800s. James Hall Nasmyth (1808-1890) was one of the first astronomers to tackle the problem. Nasmyth (inventor of the steam hammer) was a master engineer with his own workshop for casting specula in Patricroft (near Manchester, U.K.). He casted several metal mirrors (8-inch to 20-inch). This large mirror was used as a Cassegrain-Newton telescope mounted in a sheet-iron tube that was moved on trunnions, just like a cannon. Nasmyth modified and alt-az mounted Cassegrain-Newton by adding a third mirror in front of the primary in such a way that the light path was deflected to the side of the tube horizontally through the elevation bearing. The tube and trunnions were mounted on a large platform. By turning two hand wheels the observer could maneuver the telescope around the sky. In some Nasmyth reflectors the observer was seated at the eyepiece end, literally riding the telescope (Figure 1).

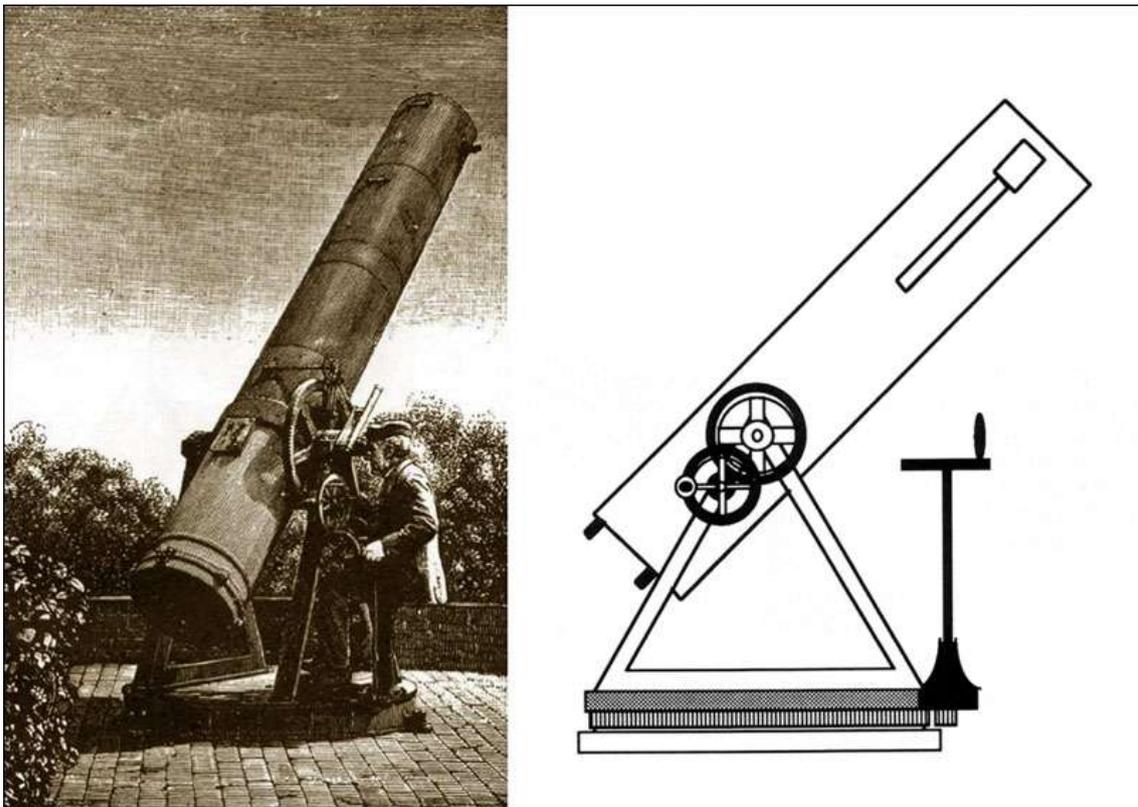


Figure 1- Nasmyth's 20-inch Cassegrain-Newton (around 1845) (left).
Diagram of a Nasmyth stationary-eyepiece telescope (right).

Another unusual telescope with more or less stationary eyepiece is the Treptow refractor of the Berlin observatory. This equatorial mounted instrument weighting 120 tons was built in 1896. The 68 cm $f/21$ lens is still the world longest telescope with a focal length of 21 m. The telescope was designed in such a way that the eyepiece is located at the center of rotation of both axes (right ascension and declination). The observer stands in this position and the

telescope turns around him. The Treptow refractor was damaged during the Second World War. Renovation took place in 1959. The telescope is still in operation at the Archenhold Observatory (Berlin) (Figure 2).



Figure 2- Archenhold Observatory and Treptow great refractor (Berlin, Treptow).

Other types of fixed eyepiece telescopes include the Turret Telescopes that were built around refractors as well as reflectors. The observer stays inside a closed room entirely independent from outside temperature. Figure 3 shows some examples of fixed eyepiece and turret refractors. The eyepiece can be fixed or it can describe a small arc of 180° (Hartness turret).

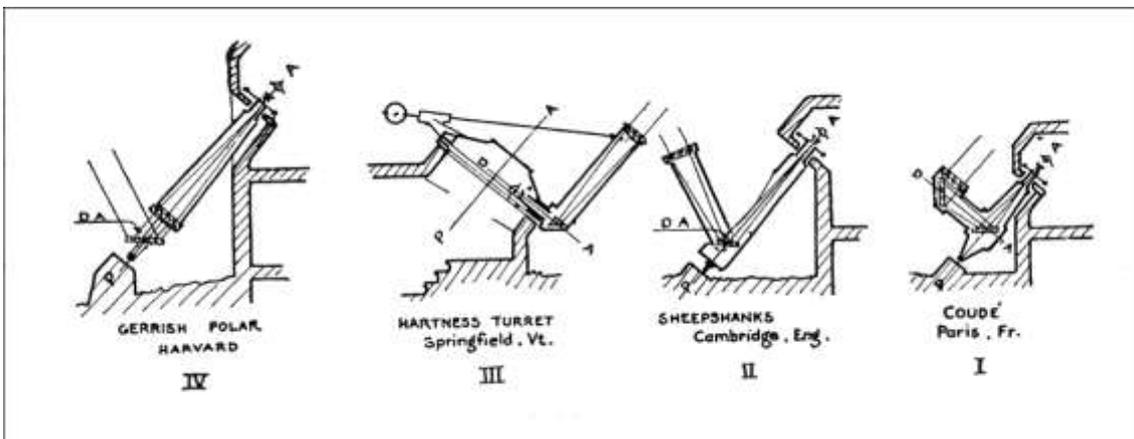


Figure 3- Fixed eyepiece refractor telescopes. Drawings by Russell Porter (Adapted from Amateur Telescope Making, Book One).

As far as reflectors are concerned the solutions are similar. Turrets can carry several telescopes as shown in Figure 4 (Porter Turret Telescope). Polar telescopes are also a possibility (Newton or Cassegrain) (Figure 4).

Perhaps the best known fixed eyepiece telescope is the Paris Observatory Coudé refractor (Figure 3 and Figure 5). This telescope was designed by Moritz Loewy in 1891 at the Paris Observatory. The image plane is kept at a fixed position while the telescope swings around the sky. The observer stays in a warm room while observing or taking astrophotographs. The Henry

brothers of the Paris observatory¹ built two Coudé refractors (10-inch and 23.5-inch). Two different objectives were built for visual and photographic work. With the aid of this unusual telescope the first Moon photographic atlas was published between 1896 and 1910 by Moritz Loewy (1833-1907) and Pierre-Henri Puiseux (1855-1928)².

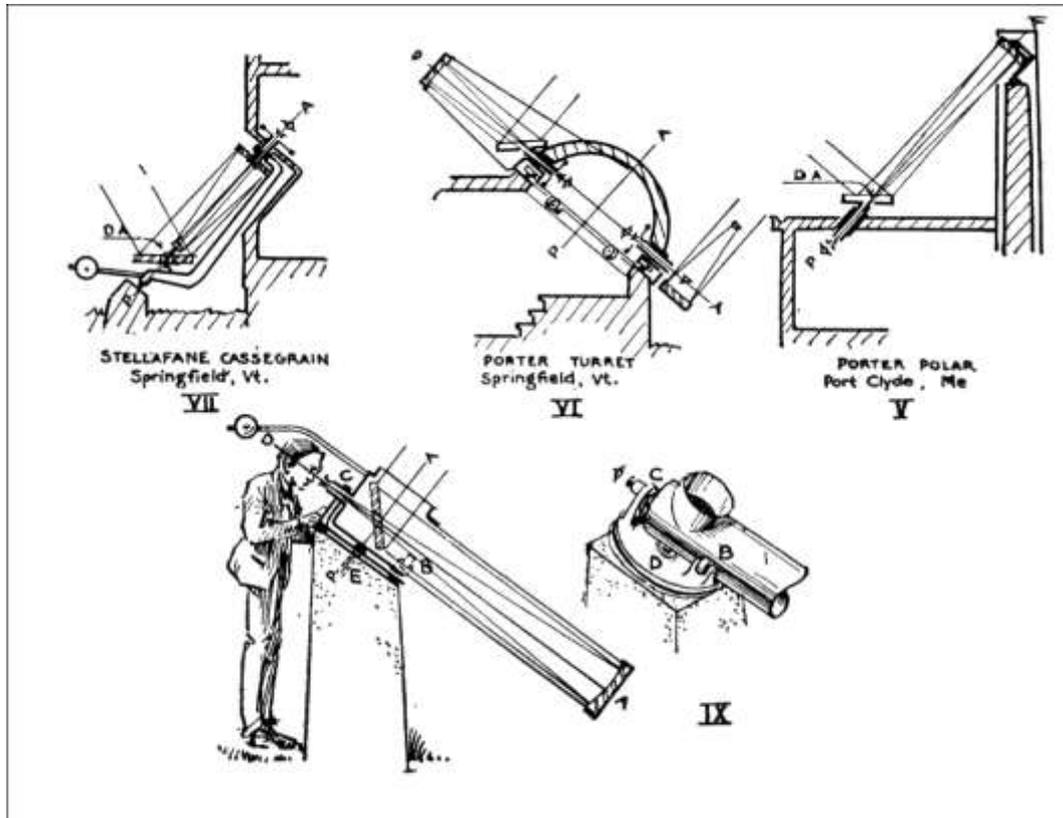


Figure 4- Fixed eyepiece reflector telescopes. Drawings by Russell Porter (Adapted from Amateur Telescope Making, Book One).

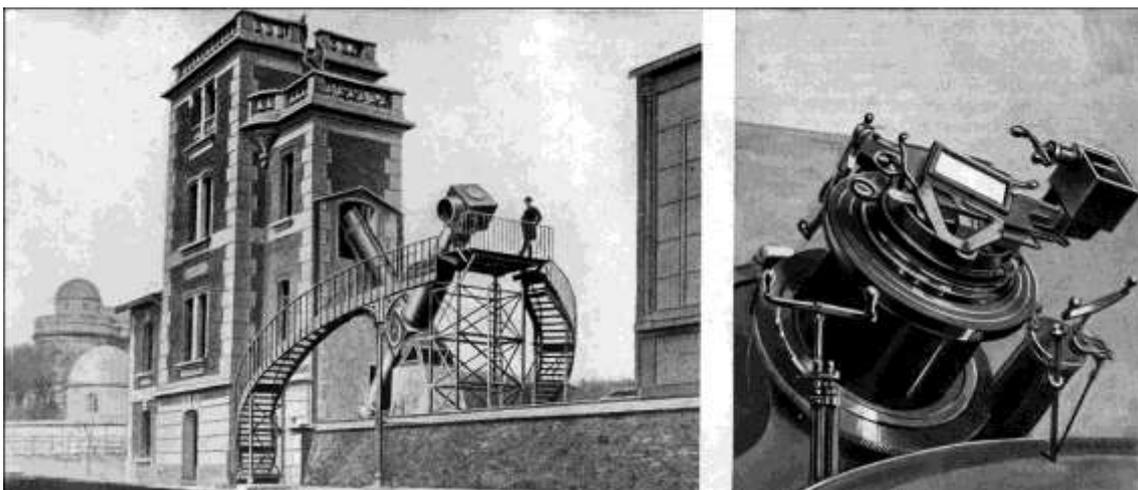


Figure 5- Paris Observatory Coudé refractor. Whole telescope (left), fixed eyepiece end (photographic plate) (right).

¹ Paul Henry (1848-1905) e Prosper Henry (1849-1903).

² *Atlas photographique de la lune, héliogravures*, Paris, 1896-1910, Collections de l'Observatoire de Paris.

Sources

- Ingalls, A.G. (editor). *Amateur Telescope Making. Book one*. Scientific American Inc., New York.
- King, H.C. (1955). *History of the Telescope*. Dover Publications Inc., New York.
- Manly, P.L. (1995). *Unusual Telescopes*. Cambridge University Press, Cambridge.