

UNUSUAL TELESCOPES – I

RUSSELL PORTER'S UNUSUAL TELESCOPES

PEDRO RÉ

<http://www.astrosurf.com/re>

Russell Williams Porter (1871-1949) studied architecture at the Massachusetts Institute of Technology. For many years Porter devoted his life to arctic exploration, making eight extended trips north of the Arctic Circle with the Admiral Robert Peary, acting in these expeditions in the capacity of artist, astronomer, surveyor, topographer and museum collector. Later in his life Porter became interested in telescope making. When the United States entered World War II he turned his skills to the advantage of the government, doing optical work throughout the war period at the National Bureau of Standards in Washington. Later he returned to Springfield, Vermont, his birthplace, as Optical Associate with the Jones and Lamson Machine Co. As a side line he built about fifty "Garden Telescopes", each with a 6" mirror (see below). In 1921, Porter organized the "Telescope Makers of Springfield". Porter was also involved in the design and construction of the 200-inch Palomar Telescope (1928 onwards). Many amateur astronomers worldwide regard Russell Porter as the father of amateur astronomy and amateur telescope making.

Porter designed and built several unusual telescopes. Among these we can mention the "Garden Telescope", the "Springfield equatorial Mount" and the "Turret Telescope".

Garden Telescope

Porter designed and patented the Garden Telescope in the 1920s. These telescopes were meant to stay outdoors as garden ornaments. The owner had to detach the primary mirror and eyepiece-diagonal assembly and take these indoors, out of the weather. Fewer than 60 garden telescopes were built (Figure 1).

These instruments were fitted with a mirror cover and sometimes were left outside facing the weather also acting as a Sundial. The castings depicted a lotus bowl holding the primary mirror with one long leaf holding the eyepiece and prism/diagonal assembly. The mount is a three-axis type with azimuth, right ascension and declination axis. If the azimuth axis is unclamped, the telescope can be used to observe terrestrial objects as an alt-az instrument. During night operation the azimuth axis is rotated until the polar axis points to the North Pole and the telescope can be used as a classical equatorial mounted instrument (Figure 2).

Springfield Equatorial Mount

The Springfield Equatorial Mount is basically a fixed eyepiece mount. The observer is kept stationary at the eyepiece end while the telescope swings around the sky. The optical path is brought out through the declination axis. The first Springfield Mount was designed by Russell Porter and built by Oscar Marshall in 1920 (assembled and tried at Stellafane¹ Amateur Telescope-Makers in Vermont). This mount employs two reflections by small prisms bringing both right ascension and declination circles very close to the observer's eye. Although there is some light loss due to the extra mirror or prisms, the viewing position is fixed and comfortable

¹ The term "Stellafane" refers to the site on the summit of Breezy Hill in Springfield, Vermont where a convention is traditionally held wevery year, and where the Springfield Telescope Makers hold most of their meetings.

and compatible with sketching and note taking. The orientation of the sky rotates with respect to the eyepiece as the telescope turns around the sky. The main counterweight of the Springfield mount is not in line with the telescope tube. This might be considered a serious drawback in the dark. Most Springfield mounts are known to carry Newton reflectors (Figures 3 and 4). Some were made around the tri-schiefspiegler reflector rather than the Newtonian.



Figure 1- Original Porter Garden Telescope sold in 2007 in auction for \$18,000 US (serial number 53).
The primary mirror and diagonal prism are not original.



Figure 2- Replica of the Porter Garden Telescope offered by the Telescopes of Vermont for \$59,000 US.

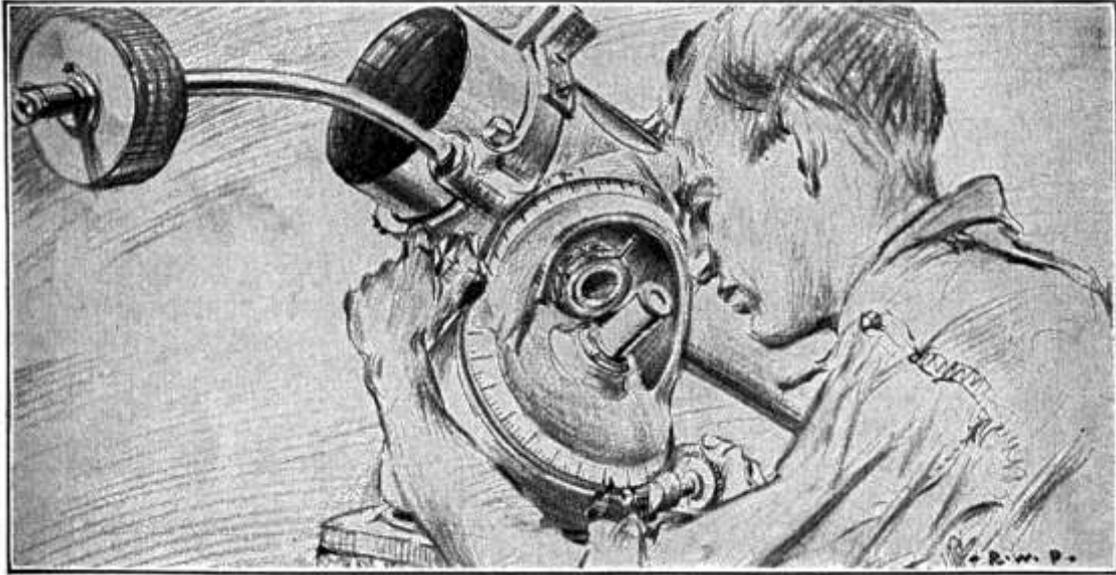


Figure 3- The Springfield Equatorial Mount, with detail of Setting Circles. Note the slow motions screws for following the stars within reach of the observer. Drawing by Russell Porter.

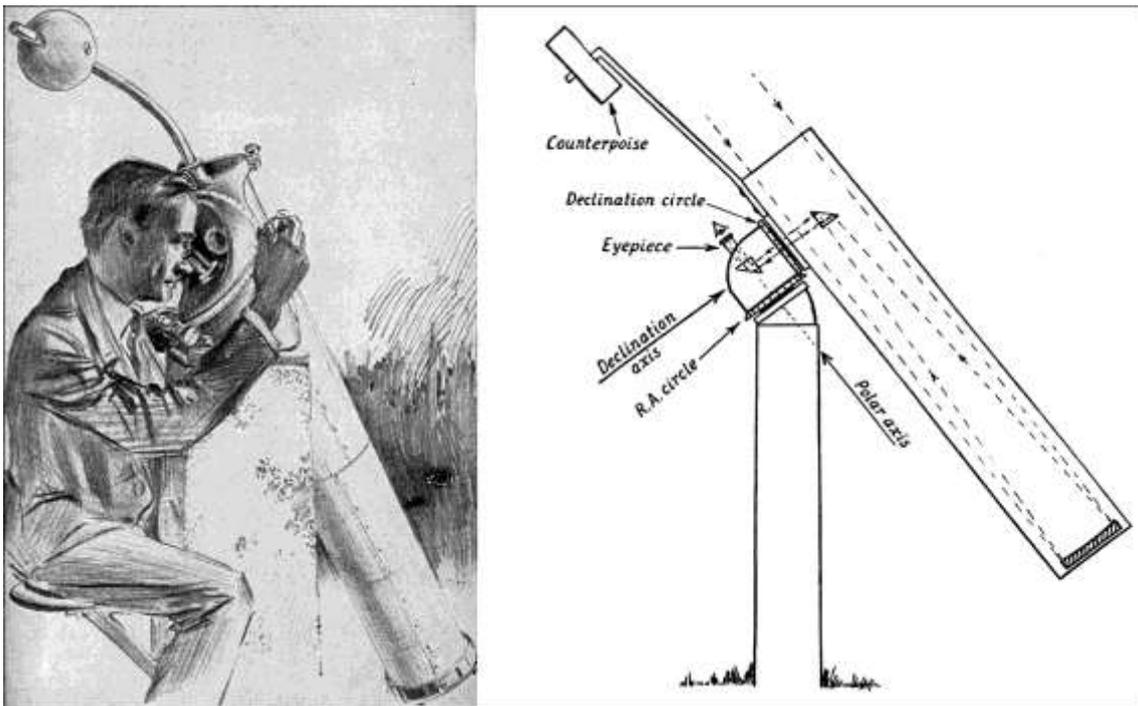


Figure 4- The Springfield Equatorial Mount. The observer's position is fixed and comfortable. Drawing by Russell Porter (left).

Turret Telescope

The Hartness Turret Telescope (24.5 cm refractor) was described for the first time in 1911² (Figure 5).

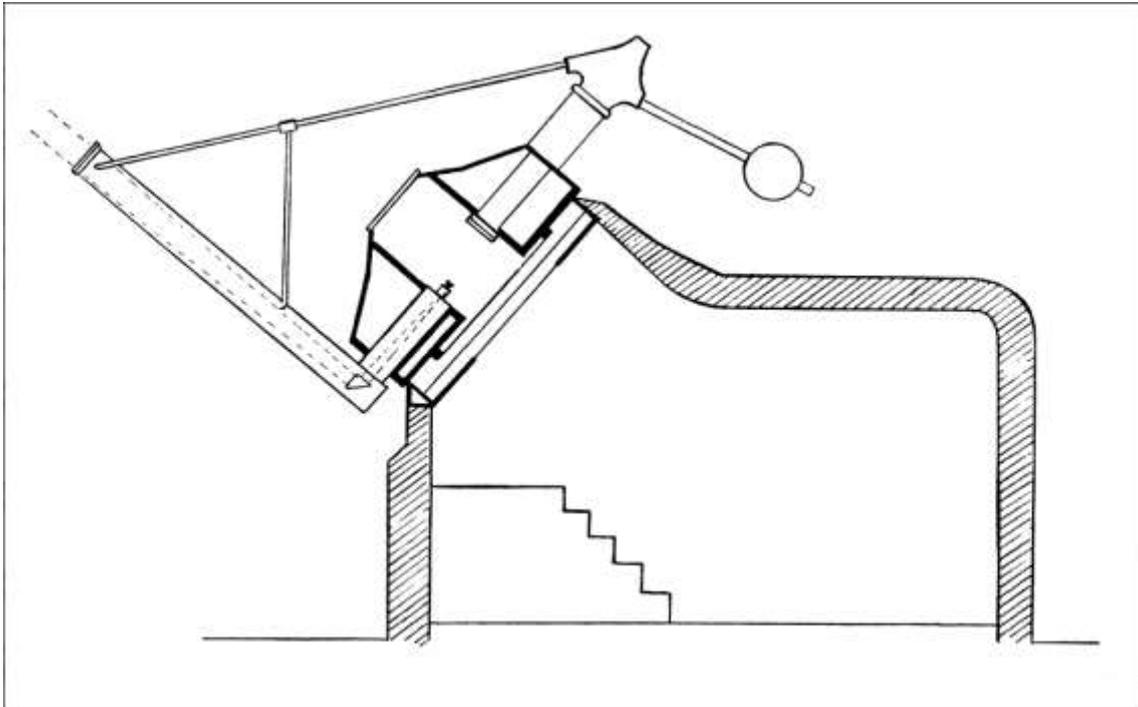


Figure 5- Diagram of the Hartness turret Telescope.

In the Hartness telescope the whole turret is rotated in order to move the telescope in right ascension. Declination motion is provided by swinging the tube of the refractor. Several windows built on the turret allow the observer to see the sky and aim the telescope. This can also be done using large setting circles.

A similar turret telescope was built in 1930 by Porter at Stellafane (Amateur Telescope Makers of Springfield) (Figure 6). This turret telescope is a reflector instead of a refractor. Starlight strikes a flat mirror located near the dome being reflected towards a main parabolic primary mirror located at the end of the struts. The light is then directed back through the hole in the flat to the eyepiece inside the dome. The flat rotates around an axis connecting the eyepiece with the primary in order to change declination. The flat can be controlled from inside the dome and the whole assembly move together in right ascension.

² *Journal of the American Society of Mechanical Engineers*, December, 1911: pages 1511-1537.



Figure 6- Recent photograph of Porter's turret telescope at Stellafane. The Springfield Telescope Makers' pink clubhouse is seen at the background. A Springfield mount can also be seen in front of the clubhouse.

Several observers can use the telescope at the same time. The Porter's turret telescope after being recently renovated is still in operation and is often used by club members.

Sources

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- King, H.C. (1955). *History of the Telescope*. Dover Publications Inc., New York.
- Manly, P.L. (1995). *Unusual Telescopes*. Cambridge University Press, Cambridge.