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Assateague Light House Fresnel Lens

By Nick Greif

America's first lighthouses used a system of silvered reflectors to intensify the light source, whale-oil lamps. During the 1850's, the United States government authorized use of a technology new to U.S.: the multi-prism Fresnel lens, invented in France by Augustin Fresnel (pronounced Fray-Nell) in 1822.

It was a complex array of dazzling glass prisms and bull's-eye lens mounted in a brass framework. Each Fresnel lens could cost up to $12,000 plus shipping costs from France. The Fresnel lens was much more efficient at collecting and directing the light rays and produced a beam five times more powerful than the reflector system. To take maximum advantage of the greater light intensity, the light had to be placed high enough to compensate for the curvature of the earth.

Fresnel lenses are ranked in six sizes called orders. The smallest, sixth-order, was used in lights on lakes and in harbors while the largest, a first-order lens, was used in seaside lighthouses. A first-order lens, consisted of over 1000 prisms, stood 10 to 12 feet tall, measured 6 feet in girth and could weigh up to 3 tons.

When the Assateague Lighthouse was built in 1867 a fixed first order Fresnel lens was installed. The Fresnel lens had reflectors that projected the light from the single oil lamp. The prisms focused the rays of the lamp into an 80,000 candlepower beam, shining eighteen miles out to sea. A reflector built in the circular brass housing of the lens projected the light off the coast of Assateague.

The Assateague lighthouse was built to accommodate a rotating Fresnel lens. However, its lens was fixed until 1961 when it was replaced.

A rotating lens created a flash pattern. Multiple lens panels were mounted around the circumference of the Fresnel lens assembly. The assembly was mounted on wheels on a circular track or floated in a container of mercury to reduce the rotational friction .Rotation was controlled by a clockwork mechanism in the Lantern Room which turned at a precise rate. The clockwork mechanism was wound by hand using a crank in the lantern room. In this way, even a 6000 pound assembly could be rotated easily. The clockwork was powered by weights which traveled through the hollow cast iron cylinder which ran from the base of the lighthouse to the lantern room. The hollow cylinder supports the steps. The weights required winding as often as every 4 hours which meant the keeper had to remain near the lantern room. In the Assateague Lighthouse there is a door one and a half levels down from the lantern room in the hollow cast iron cylinder for the purpose of gaining access to the weights.

The Lighthouse Keeper could add or remove weights to regulate the speed of the rotation. There is another door at the base of the cast iron cylinder. The purpose of this door is to retrieve a weight if it fell. It is now frozen partially open.

The Fresnel lens with the original kerosene lamp is on display at the Oyster Museum. In 1933, the kerosene lamp was replaced by three 100 watt bulbs which showed 18 miles out to sea. Information was provided by the Oyster Museum and Steve Scyoc of the International Chimney Corporation.