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Lighthouses Along the Delaware

GREAT improvements are noticeable in the Fourth Lighthouse District, in which is included the port of Philadelphia, since T. J. Rout took charge as inspector. Among these betterments may be counted the substitution of oil-vapor lamps for the old type of lamp, the intensity of the light being much increased. The following description of the lighthouses on the Delaware is from the pen of Inspector Rout himself:

Coming up the Delaware Bay and River after sunset one sees many lighthouses flashing their rays across the water. The lights may mean little to the casual observer, but to those navigating a vessel, they represent a great deal, as the lights are necessary to bring them safely into port. Lighthouses are passed and repassed by many tourists and passengers, but few give any thought as to how they are built, operated or maintained.

The United States Lighthouse Service is a Bureau of the Department of Commerce under the charge of a Commissioner, George R. Putnam. Nineteen separate districts are maintained throughout the United States and its possessions, each in charge of an inspector. The Fourth district embraces the Delaware Bay and River and has local offices in the Post Office Building, Philadelphia.

A vessel approaching Philadelphia from the sea has a natural channel for a distance of about 40 miles, beyond which the channel is dredged.

Most Dangerous Shoals Marked.

Most of the dangerous shoals in the bay are marked by lighthouses or buoys, the dredged channels being marked by range lights. At such ranges the front light is located close to the water's edge and the rear light is located in a high tower some distance inland. When a mariner gets a pair of these range lights in line one above the other, he knows he is in the centre of the channel and can safely continue on his course. Some rear lights are as far as three miles from the water, and it is a novel and unexpected sight when driving through a farming district to pass a lighthouse so far from the shore.

In this district there are 88 lights, 189 buoys, 11 fog signals and three day beacons. To keep the lights in efficient condition require the services of about 124 employes.

The object of a lighthouse is to indicate dangers to navigation and to guide mariners when approaching or sailing along a coast or river. With this object in view, lighthouses are made of different designs and painted with different colors, and the lights and fog signals are given different characteristics, easily recognizable by the navigator.

One of the Oldest Lighthouses.

There are three lighthouses of historical interest in this district. Cape Henlopen light is one of the oldest in the United States, having been erected by the Colonial Government in 1764. In 1789 the Federal Government assumed jurisdiction over this structure along with seven others.

The second, Brandywine Shoal Lighthouse, is in the middle of Delaware Bay, distant eight miles from the sea. It is the first lighthouse in the United States to be erected on screw piles. In this structure the lower ends of the iron piles are provided with discs or screws roughly resembling a propeller blade in appearance, which were driven down into the bottom of the bay in the same manner as a wood screw is screwed into a piece of wood. This lighthouse was completed in 1850, but owing to general deterioration it is proposed to replace the structure with one of unprotected reinforced concrete. When completed, this will be the first lighthouse of its kind in the United States to be located on a submarine site.

Fourteen-Foot Bank Light Station.

The third, Fourteen-Foot Bank Lighthouse, about 16 miles from the sea, rests on an iron cylinder 73 feet high and 35 feet in diameter. It is the first lighthouse in the United States erected on a caisson foundation by the pneumatic process. The shell was constructed on shore, launched and towed to the site and was then sunk to the bottom. After the water was forced from the working chamber by means of compressed air, workmen descended on the inside and removed the sand. In this manner the foundation was sunk 33 feet below the bottom of the bay. It was completed in 1886.

The tallest lighthouse in the district is at Cape May, N. J. The light is 165 feet above the water, its intensity 210,000 candles, and is visible for 19 miles.

In most of the important modern lighthouses incandescent oil vapor is used as the illuminant. Mineral oil is heated until it vaporizes and is then burned in a mantle in the same manner as illuminating gas is used in the home. This class of light is more powerful than the ordinary wick lamp using mineral oil, and the increase in candle power is about ninefold for the order of light mostly used in this district.

Lenses Made Abroad.

The lenses used for intensifying the lights were formerly made in England, France and Germany only, but recently several manufacturers in the United States have become interested in this line of work, and it is believed that the time is not far distant when we will not have to go abroad for such articles.

There are various devices used to produce characteristics in lights. If the whole lens revolves, an occulting light may be produced by using blank panels in the lens in place of horizontal glass prisms, or a flashing light is produced if the panels of the lens are set with annual glass prisms. In the smaller lights the occultations are produced by a rising and falling shade or by revolving shutters or screens with openings between them close to the flame or mantle.

The lighthouses are generally inspected four times each year, but they are visited at other times in order to deliver supplies, make repairs, etc.

Lighthouses located in the water are attended by three keepers, each of whom is allowed shore liberty of six days per month. No families are allowed at such stations, as is the case with shore lights. At many shore lights dwellings are provided, with an allowance of fuel.

The lighthouse keeper is, as a rule, a faithful employe who takes great pride in his work. Nearly all of them are watermen when appointed and they seldom leave the service after entering it. The old adage, "Few die, and none resign," is generally applicable to lighthouse keepers. The oldest keeper in this district is 85, and some have been in the service for over 40 years. It is to be regretted that there is no pension system whereby these faithful employes could be retired.

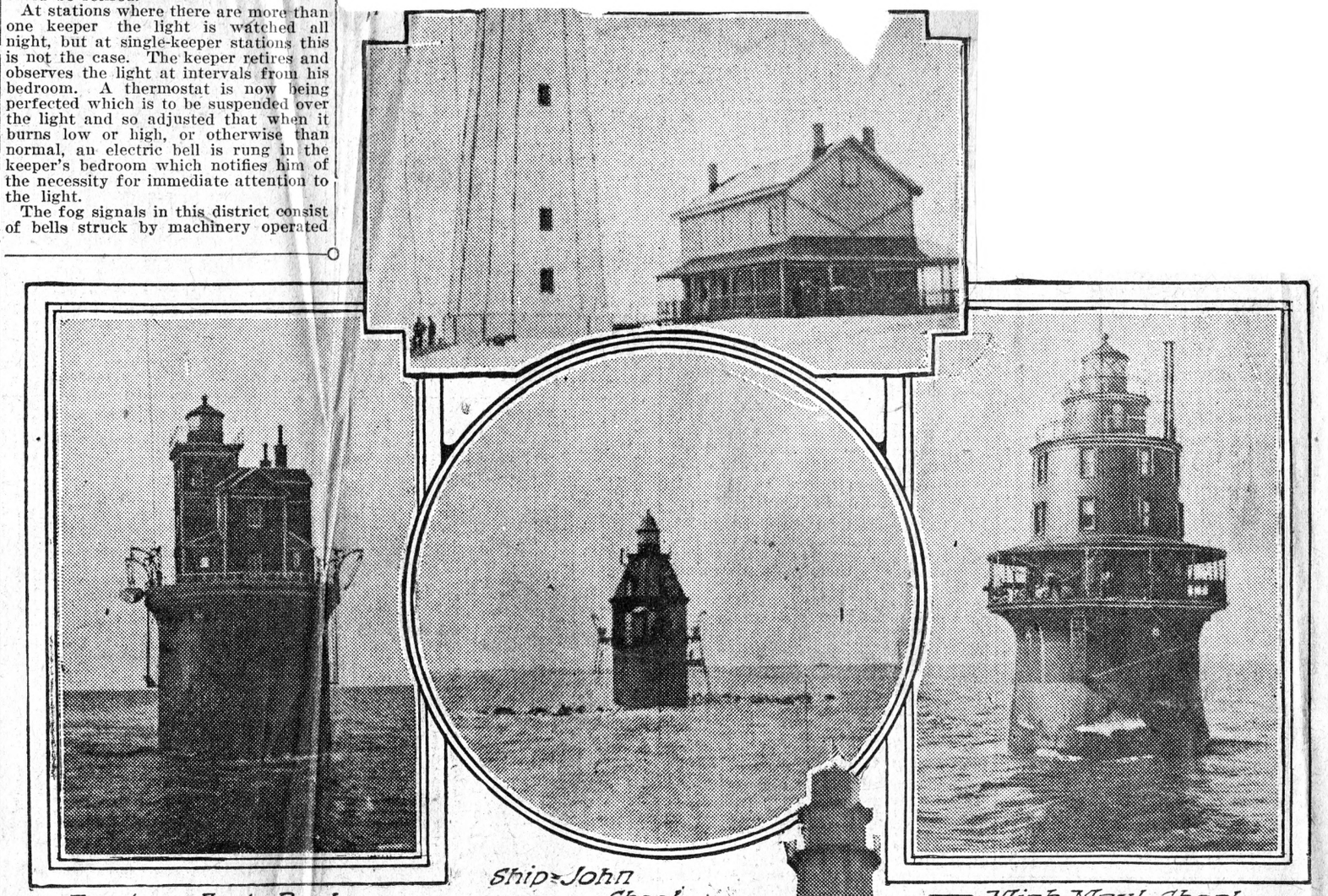
At stations where there are more than one keeper the light is watched all night, but at single-keeper stations this is not the case. The keeper retires and observes the light at intervals from his bedroom. A thermostat is now being perfected which is to be suspended over the light and so adjusted that when it burns low or high, or otherwise than normal, an electric bell is rung in the keeper's bedroom which notifies him of the necessity for immediate attention to the light.

The fog signals in this district consist of bells struck by machinery operated by falling weights, and of trumpets operated by compressed air. For compressing the air, oil-burning engines similar to launch motors are used and the air is stored in heavy steel tanks ready to be liberated through the trumpet, the number of blasts per minute and their length being controlled by an automatic device.

The lighted buoys consume oil gas, and with one charging the flame will burn many months without attention, the body of the buoy being used as a storage tank.

Lights which are powerful enough to be seen a long distance have their visibility limited by the curvature of the earth. This curvature is about eight inches in one statute mile and increases as the square of the distance, being thus four times eight inches in two miles; nine times eight inches in three miles, and so on. For instance, a light 100 feet above the water could be seen from a pilot house 15 feet above the water from a point 18.35 statute miles away, but a light 200 feet above the water, instead of being seen twice as far, or 36.7 statute miles, would sink out of sight at 23.83 statute miles.

T. J. ROUT.



DELAWARE RIVER LIGHTHOUSES

Money in Good Roads.

That there are upward of $400,000,000 of good roads bonds issued and outstanding is indicated by the Good Roads Year Book of the United States, the 1913 edition of which has just been issued, containing a resume of the whole road situation. It is evident that whatever may be the faults in methods of construction and maintenance, money is being spent in sufficient amount to bring about a vast improvement in the public roads. The Year Book shows $137,000,000 of State and road bonds authorized, and $156,500,000 of county bonds outstanding on January 1, 1913, making a total of $293,500,000. As this is based on reports from about 75 per cent. of the counties in the

held for a few days only, either. It is to continue indefinitely, and in time the price may get even cheaper yet.

For Uncle Sam has but recently embarked in the horse business on such a gigantic scale that it's not improbable the business of the private breeders will be seriously affected. He has started what is probably the largest horse farm in the world, a farm of 5500 acres, only a few hours' ride from the National Capital, at Front Royal, in the long blue grass section of Virginia. And this is only the first of his farms. He intends to start several and turn out thoroughbreds by the tens of thousands.

Supplies Entire Army.

Today the farm is already supplying practically the entire United States army with its mounts. A short time hence and it will be supplying civilians, and a short time more, according to Captain Caspar H. Conrad, who is in charge and is generally acknowledged to be one of the greatest experts in horse flesh in America, it will be supplying most of the civilized nations of