

burns steadily, and gives a better light after burning fifteen hours than when first lighted. The wicks require no trimming during the the night. Keepers' dwellings built in two storeys, each having five rooms. The upper storey is occupied by the principal keeper, and the lower by the assistant. A building is being erected alongside the lighthouse for a fog signal on the American plan. Keepers are supplied with coal and light, but they provision themselves. They are also supplied with uniforms once every three years, which they are enjoined to wear when visited by their superior officers, and when attending divine service. The Board supplies each station with copies of the *Illustrated News* and of the *Weekly Scotsman*; also with a couple of periodicals, besides standard works of general literature, which latter are circulated from station to station through the book post. Furniture, of a plain and substantial kind, is supplied by the Board. There is a furnished apartment in the principal keeper's dwelling which is kept for the use of the Inspector or other official visiting the station. Appended hereto is a list of the furniture and utensils supplied to the St. Abb's Head Lighthouse.\*

Keepers are shifted from station to station, as the exigencies of the service require. Sometimes a keeper is not at a station more than six months, and sometimes he is allowed to remain as long as seven or eight years. Salaries vary at different stations. Keepers do not carry their rate of pay with them on being shifted. Rock stations have the highest pay. Most of the shore stations have gardens attached. The education of the keepers' children is not provided by the Board; where no school is near, this has to be done by the keepers themselves.

*Time of Lighting up.*—There is a table or calendar posted up in the light-room, showing the time for every day in the year in which the light is to be lighted and extinguished.

*Girdleness Light.*—I had to stay at Aytown for the night, and returned next morning to Edinburgh, proceeding thence to Aberdeen, for the purpose of seeing the Girdleness Lighthouse, at the entrance of Aberdeen Harbour. The tower of this lighthouse is a splendid structure of granite. Contiguous to it are the keeper's dwellings, also built of granite, the whole being surrounded by a high granite wall, and the enclosure being paved throughout with the same material. Outside this enclosure is a larger one, containing several acres, part of which is divided between the keepers for gardens, and the remainder is rented to them by the Board.

The Girdleness is a first-order dioptric fixed light, with a second light (catadioptric) of less radius, half-way down the tower. This lower light has thirteen lamps, the same as those in use at Dog Island. In both upper and lower lamps paraffin is used. The keeper here spoke quite as highly of this illuminant as did the one at St. Abb's Head. The lamp in the dioptric apparatus is a mechanical one, similar to that at St. Abb's Head, and, like it, was altered to suit for burning paraffin, by having a Doty's four-wick burner fitted, which answers admirably. The wicks do not char, and they never require cutting with the scissors; all that is necessary is to rub off the carbonized surface with the finger or a little cotton waste. The old wicks for colza oil are still used, but, to make them answer well, two instead of one have to be put on the two outside burners, the single wick not being thick enough. A little difficulty was experienced at first in getting a good light, but it was found that this arose through the paraffin having been put in the cisterns formerly used for colza without their having been thoroughly cleaned. Every trace of the colza oil should be removed from the lamp and cistern before using paraffin.

The keeper's replies to various questions I put to him on other matters connected with the Lighthouse service coincided entirely with what I gathered from the keeper of St Abb's Head Light.

*Montroseness Light*, at the entrance of Montrose Harbour, was the next one I visited. This light is a second-order dioptric, with glass mirror, and shows over an arc of  $150^\circ$ . The tower is 100 feet high and is built of brick. It has a first-order lantern; the apparatus stands on a pillar, but the lamp table being stayed with angle iron to the iron trimming path round the inside of lantern, all vibration of the apparatus is prevented. Light first exhibited in 1870; paraffin in use since last December; keeper states that it gives brighter light than colza, and is less trouble to attend to; but consumption is rather more. With paraffin the lamp wicks will last a month or more, whilst with colza they had to be renewed after burning for three nights. To extinguish the light the supply of paraffin should be turned off, and the flame allowed to go out by itself; the carbonized portion of the top of the wick should then be wiped off with a rag or a bit of cotton waste, turning the hand in doing this round the top of the burners always in one direction; no further trimming is required. This, like the other lights, is officially inspected twice a year at least by Mr. Young, the Superintendent of Light-keepers' Duties, and once a year by the Commissioners, who are accompanied by the Secretary. One of the Engineers to the Board also usually visits the station once during the year, as also does the Artificer, to see if any repairs are necessary about the lamps or apparatus. At this station I observed that black varnish or Brunswick black was used for all the iron work instead of paint. The keeper spoke highly of it, and said that it can be laid on quickly, dries immediately, and lasts longer than paint, but before using it the iron work should have a first coat of black paint.

*Bell Rock Lighthouse.*—From Montrose I went to Arbroath to see this celebrated lighthouse. The Bell Rock Lighthouse is situated about 10 miles S. by E.  $\frac{1}{2}$  E. off Arbroath, in Forfarshire. It is built on a rock covered at high water, and over which the sea breaks heavily during the gales in winter. The light is catadioptric, revolving, showing red and white alternately every minute. It has sixteen lamps similar to those at Dog Island, arranged on a square iron frame. The diminution of power of the red rays is in great measure compensated for by having on opposite sides of this frame five lamps showing red by means of ruby chimneys, and three only on each of the other sides showing white. Paraffin had been burnt since August last. The first set of wicks used with paraffin lasted seven and a half months; when colza was used the wicks had to be renewed once a week. Returning to a plan devised by the late Robert Stevenson, an experiment is being made by using looking-glass in one of the mirrors instead of polished silver. The glass is in eight pieces, each being curved to the shape of the parabolic reflector. The keeper was of opinion that the glass would not answer so well as the silver, as the silvering already shows signs of dimness in places, arising from damp getting to it. No

\* This list of furniture, bedding, crockery, cooking utensils, tools, &c., is not printed herewith, on account of its length.