

The flashes are produced by revolving an arrangement of lenses around the lamp as a centre, and much ingenuity has been displayed in the details for carrying round the heavy machinery with the least possible friction. Today ball bearings are used on small apparatus, while the largest and most quickly revolving apparatus are floated in troughs of mercury. The most perfect development theoretically of this system of concentration of the rays is the French invention known as the *feu éclair*. This light is based on the laws that the time which a flash takes to make an impression varies inversely as its intensity, and that once having made an impression a certain time is necessary to allow a steady light to produce its full effect, and that this time also varies inversely as the intensity of the light. It has been demonstrated that a very powerful beam will produce its full effect on the eye in the space of 1-10 second. Applied to lighthouses, this means that there is no advantage in making a flash of longer duration than 1-10 second, for this will allow it to be seen as a flash at the utmost distance at which it can possibly affect the eye, while as it is approached it will of course appear longer and stronger.

In the *feux éclairs* the lenses are so designed as to gather the whole of the light into one narrow beam, and are revolved so rapidly as to give flashes of about 1-10 second duration at intervals of 10 seconds. The resulting speed of the revolving beam of light is very great. Seventy miles is not an extreme limit of visibility for the most powerful lights, and at that radius the beam is traveling at the rate of about 440 miles in 10 seconds. Its width, therefore, to act on the eye, for 1-10 second, must be nearly $4\frac{1}{2}$ miles. To give the necessary divergence to the beam, an extremely large size of flame is required, and in practice it is found impossible to maintain a flame large enough to give extreme results. The sailor, who usually cares nothing about theories, does not seem to take kindly to the *feu éclair*. He complains that it is impossible to locate a flash before it disappears, and he prefers a light of which he can take a bearing while it remains visible. There-