Upwelling water from the deeps can be assumed to be a generating process of overfalls, but the scarcity of data makes this uncertain. Isolated observations taken far to the Southward suggest that overfalls may be formed without the occurrence of upward-moving water.

The specific movements which the overfalls sometimes execute remain unexplained, as also does the behaviour of the temperature of the water before, during and after the overfalls. It would seem, therefore, that it is necessary to collate extensive data and to carry out systematic observations in order to elucidate such stationary processes.

ON THE USE OF YELLOW-TINTED GLASSES IN THE DESIGN OF MARITIME OR AVIATION LIGHTHOUSES.

(From à note by Mr. ANDRÉ BLONDEL, in the *Comptes Rendus de l'Académie des Sciences*, Paris, No. 17, 22 Oct. 1934).

It is noteworthy that the colouring of white lights, which were formerly produced solely by petroleum oil lamps with one or several concentric wicks yielding a somewhat yellowish light, has been greatly altered by improvements in the modern lighting agents which have nearly everywhere replaced them, viz. AUER mantles made incandescent by gas or petroleum oil vapour, acetylene flares, gas-filled electric filament bulbs and arc lamps; in this manner the proportion of more refrangible to less refrangible rays in the beam of light from the lighthouses has been greatly augmented. It will be opportune to consider the advantages and disadvantages liable to be experienced as a result.

It must moreover be noted that the question affects maritime lighthouses in an appreciably different manner from motor-car headlights.

At great distances the reflexion of the light on mist or on the particles of moisture in the atmosphere, which is very troublesome for the observer in the case of a motor-car, is, on the contrary, favourable for the appreciation of lights by the navigator; for the beams from the lighthouse in slightly hazy weather are thus materialised near the lighthouse and are visible at a great distance; even when the weather is fairly clear, they serve to mark the position of a lighthouse when a direct view of the light is impeded by the curvature of the sea.

But at short distances the white beams are blinding and have quite often given rise to objections from fishermen or coasters when they emanate from low lights and the natural divergence of the beams is such that they meet the sea at a short distance.

In such cases the dazzling effect might be greatly reduced by filtering the light from the illuminant in use, by sheets or by a sleeve (less expensive) of a glass which will absorb the violet and ultra-violet rays, these being the most injurious and being incapable of improving the visibility even at great distances.

With regard to low-lying, more or less short-range harbour lights, the visibility of which depends solely on direct vision, a further step may be made in this direction by filtering the light as in motor-cars, through glasses of a more or less marked yellow tint, provided there is no risk of this tint turning to red by absorption in mist, like that of petroleum oil lamps. Actually, thanks to recent progress in the technique of coloured glass, it is possible nowadays to produce yellow glasses which cut out the wave lengths fairly sharply from a certain limit onwards, this limit, according to the glasses used, being 3500, 4000, 4250, 4750 or 5000 angströms. The selenium-cadmium glasses now used for motor-car headlights, which cut out at 4750 or 5000 angströms, according to whether of the light or the dark type, have a so-called amber colouring which would be suitable for very short-range lights. For the remainder it would be well to take 4750 or 4500 angströms as limit; thus the "canary yellow" colours are obtained.

The only objection that might be raised against yellow glasses is relative to the losses to which they give rise and which are of two kinds: on the one hand, reflexion on the entry and exit surfaces, say altogether about 9 per cent irrecoverable at great distances owing to the aberration of the reflected rays; on the other hand, global absorp-

tion of the rays transmitted by the shaded glass; the above-mentioned yellow glasses reduce the global coefficient of transmission to figures varying from 0.70 to 0.95 according to colouring and thickness. This is not very troublesome because the lost light is principally taken from the rays which are more refrangible than the yellow and hence which would be the most absorbed by mist. Their curtailment at the start therefore scarcely modifies the useful efficiency of a lighthouse, the candle power of which in clear weather is always superabundant.

In order to reduce the losses by reflexion, the optical apparatus for new establishments might be carried out in yellow glass. Illumination by electric incandescence lends itself to a simpler solution, namely the use of yellow glass bulbs of much larger size than those of motor-car headlights; but for this the co-operation of the manufacturers would be necessary.

Failing these solutions, the use of yellow sleeves around the white illuminants remains a rational one, because an additional loss of 9 per cent entails but a much smaller proportion of reduction of optical range, and the mistier the weather, the smaller comparatively will be this proportion.

The greater the photochromatic ratio, that is the factor by which the illumination received by the eye must be multiplied in order that a very small point of light, seen as a neutral and grayish point at a great distance, may appear distinctly coloured, the more the light behaves at a great distance like a white light; this proves (and it may be verified by sight) that in hazy weather the yellow colouring gives rise to no confusion with a red light and there can therefore be no disadvantage in its use. It is certainly preferable to the reddish colour of the petroleum oil lights.

Moreover the yellow colouring which, in contrast to what has happened ashore, has never been utilised for maritime lights (1), may be of real advantage as a distinctive characteristic, for instance for harbour lights which at present are white, by better avoiding confusion with electric street-lighting or private installations the number of which in seaports is continually increasing.

To sum up: although entailing a certain reduction in the range, it would seem that to give a suitably chosen yellow colour to the lights which at present are white, could improve maritime lighting from the point of view of safety, by diminishing the dazzling effect at the harbour entrances and rendering its character more distinctive.

The same would appear to hold good for the lights of airports, where the question of dazzle must also be taken into consideration.

TIEFSEEBUCH.

(THE DEEP-SEA BOOK.)

E. S. MITTLER & SOHN, BERLIN, 1934.

(viii + 144 pp., 68 figs. 33 plates, 22 × 14 cm.)

This handbook forms the third volume of a series entitled *Das Meer in volkstümlichen Darstellungen* (The Sea, Popular Descriptions), published by the Institut für Meereskunde of Berlin, under the editorship of Prof. Dr. G. WÜST, and its full title is "The Deep-sea Book, an outline of modern deep-sea research".

The names of the contributors, each of whom has written a short chapter on a subject on which he is a recognised authority, are a guarantee that the information given is reliable.

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(1) *An orange light was established in September* 1930 *for experimental purposes in the Princes Channel (River Thames approach) — see Admiralty* Notice to Mariners, *No.* 1334 of 1930. *It has since been withdrawn.* (I.H.B.).