

On some new Forms of Polarizing-Prism

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intensity of the illumination of the surface of the first Nicol depends solely on the intrinsic brightness of the source of light. The filament is practically a slit with the source of light brought into contact with it, so there is no difficulty about the whole of the surface of the Nicol being illuminated, and the illumination is just as powerful as would be given by a glowing sheet of the same brightness half an inch broad placed a little distance behind a slit. The intrinsic brightness of the filament of a Swan lamp is many times greater than that of a good gas-flame viewed edgewise. Besides, even if the gas-flame be placed very close to the slit, it is only the nearer portion of the flame that illuminates the whole surface of the Nicol. The further portion only lights up a narrow strip in the middle of the surface.

I used two flat-ended Nicols, belonging to Mr. Glazebrook, of about half an inch aperture. One of these, which gave an angular throw of $15'$, had a left-handed rotation-angle of $38'$.

I find that the plan of reading by means of the motion of the patch of extinction has been the subject of an elaborate paper by Lippich (*Sitzb. der kais. Akad. der Wissensch. Wien*, Febr. 1882).

V. *On some new Forms of Polarizing-Prism.*

By Mr. H. G. MADAN*.

MR. MADAN exhibited and described some new forms of polarizing-prisms. The first of these is by M. Bertrand, and has been described by him (*Comptes Rendus*, September 29, 1884). The prism consists of a parallelepiped of dense flint glass of refractive index 1.658 , the same as that of Iceland spar for the ordinary ray. The glass prism is cut like the spar of a Nicol's prism, a cleavage-plate of spar being cemented between the two halves by an organic cement of refractive power slightly greater than 1.658 . A beam of light traversing the prism is incident upon the spar at an angle of $76^{\circ} 44'$. The ordinary ray passes through without change; but the extraordinary ray is totally reflected at the

* Read February 28, 1885.

first surface. The prism gives a field of 40° . M. Bertrand's prism has the great advantage of requiring only a very small quantity of Iceland spar, a substance that is becoming very scarce and expensive. The other prisms shown were : a similar one by M. Bertrand, described in the same paper ; a double-image prism by Ahrens, described in the *Phil. Mag.* for January 1885 ; and a modification of the latter by Mr. Madan, described in ' *Nature* ' for February 19.

VI. *The most Economical Potential-difference to employ with Incandescent Lamps.* By Professors W. E. AYRTON, *F.R.S.*, and JOHN PERRY, *M.E.**

THE subject in connection with which the accompanying paper is a small contribution is one of considerable commercial importance. It has long been known that the luminous power of an electric lamp increased much more rapidly than the power electrically expended on it ; or, that the number of candles per horse-power increased as the lamp was made to become brighter and brighter. Perhaps the earliest experiments on the subject were those published by Sir William Thomson in 1881, and those made by our students in 1880. Since that time (that is, during the last five years) tests of the efficiency of various types of incandescent lamps have been made over and over again by various persons, without perhaps its being clearly realized that such efficiency-experiments by themselves gave us no idea of the commercial value of any particular lamp.

It is not sufficient to know that when a lamp is giving out a certain number of candles it absorbs so much power per candle, and when giving out a much larger number of candles it absorbs so much less power per candle ; but what must be known in addition is the life of the lamp at each of these two candle-powers, before we can decide whether it is more economical to use the lamp with the filament at not much more than a dull red or when brilliantly luminous with a bluish tint.

* Read February 28, 1885.