

## LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

## The Phonograph

I HAVE received the following interesting letter from Dr. Blake, Boston, U.S.A. :—

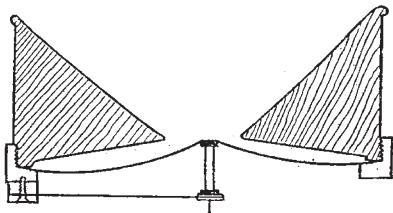
W. H. PREECE

"You may possibly be interested in some recent experiments which I have made with the phonograph, and unless you have been pursuing the same course, may find them worthy of repetition.

"I found that the groove in the cylinder, covered with tin-foil, became a resonator for the high scratching noise of the embossing point, materially interfering with the reproduction of the quality of the voice.

"By stretching a thin layer of rubber tissue over the cylinder this resonating effect was done away with and the scratching noise materially lessened. This experiment was new to Mr. Edison, and has since been repeated with like success.

"Since experiments made with the ferrotone telephone and phonograph-discs show that they transmit with almost astonishing accuracy the lighter over-tones of the human voice, but at the same time give especial prominence to certain over-tones to which the metal disc especially responds, I constructed a diaphragm upon the principle of the human drum membrane, to be used as a reproducing disc; the object being to employ a membrane which, from its structure and shape, would reproduce the lighter over-tones representing the quality of the voice, and at the same time 'cut off' the sharper exaggerated over-tones embossed as such by the metal disc upon the tin-foil. The results of the experiments with such a membrane were very



A small rod of light pine wood having a rubber pad at either end is placed between the boss which carries the embossing point and the centre of the membrane. This, the first form of disc constructed, worked very well.

gratifying. After embossing with the metal disc, the curved membrane was substituted, and the voice reproduced from the phonograph without the sharper over-tones, with much more natural and agreeable quality and with more than double intensity. On using the curved membrane for embossing as well as reproducing, I found, as would be expected, that the quality of the voice was more accurately represented, and that the embossing could be done at a distance of over fifteen feet from the phonograph, and be reproduced with clearness.

"Mr. Edison is now experimenting with this form of diaphragm, and, I understand, with very good results.

"The material used for these discs may be either stout felted paper (to be varnished on the outer surface when used for speaking) or drum-head, moistened and pressed into concave form before using. The principle governing the vibrations of such a disc is that of imparting the vibrations to the centre of a membrane the curve of which enables it to reproduce a large range of over-tones, its tension serving as a counterbalance to the central pressure.

CLARENCE J. BLAKE

W. H. Preece, Esq., London."

## Physical Science for Artists

WITH reference to Mr. Norman Lockyer's and Prof. Brücke's observations on the appearance presented by the shadow of the

earth at sunset or sunrise (NATURE, vol. xviii. p. 223), I beg to be allowed to confirm them by my experience in Switzerland. Early starts for expeditions give one, among other good things, opportunities for seeing sunrise from the very beginning, and I have repeatedly seen the shadow of the earth, as it were, gradually driven down by the illuminated portion of the sky, the boundary between them being very well marked and roughly circular like the horizon, but I think with a greater apparent curvature. At this distance of time (some years) I cannot remember anything of an effect of foreshortening such as Prof. Brücke notices.

Once, in 1868, I saw an even more curious effect. As we stood at sunrise on a moderately sharp ridge running pretty closely north and south, at a height of 9,000 to 10,000 feet, there was an interval of appreciable duration in which it was a visible and striking fact that it was night on one side of the ridge and day on the other.

F. POLLOCK

Savile Club, Savile Row, W., June 27

## Cyclones and Anticyclones

I WILL endeavour to put into a written form the ideas which have occurred to me respecting the law which, as I suppose, connects and governs the atmospheric phenomena which I see referred to in the newspapers as cyclones and anticyclones. I have seen it stated, as the result of observation, that in whatever direction the wind may be blowing at any given time, if you place your back to it the barometer will be found to stand lower upon your left than upon your right. I have also seen it stated that what are termed cyclones are rotatory movements of the air occasioned by the meeting and passing one another of two currents of air moving in opposite, or nearly opposite, directions, and that these cyclones or rotatory storms, though differing much in area, have certain features common to most, if not all, of them; namely, that the direction of their rotation is from right to left, or, in other words, the opposite of the motion of the hands of a watch, and that in their centre is found a considerable diminution of atmospheric pressure. On the other hand, in what is termed an anticyclone, the direction of the rotatory movement is in the opposite direction, that is, from left to right, or in the same direction as the movement of the hands of a watch, while in the central region the barometer is found to be standing high.

These various phenomena appear to me to be closely connected one with the other, and to be, in fact, due to the rotation of the earth upon its axis, which, having regard to its spherical form, makes it inevitable that the superincumbent air at the equator must rotate with the earth under it at a much greater velocity than that which is near the pole. For it seems evident that a current of air coming from the north travels into a region which is moving to the east more quickly than itself, and will therefore present itself as a north-east wind to the inhabitants of the more northern latitude, and not only so, but will tend to arrest the air on its right or westerly hand, while it is left or abandoned by the more quickly eastward-moving air on its left or easterly hand. This consideration will explain, so far as northerly winds are concerned, the first-mentioned of the phenomena above referred to, namely, the lower glass on the left hand, the higher glass on the right. Taking next the case of a northerly wind, it will be obvious that in travelling northward it comes to a country moving westward more slowly than itself, and consequently appears as a north-west wind to the people over whose land it passes; and not only so, but by pressing on the air to the right, or eastward side, it increases pressure in that direction, while it tends to leave behind the more slowly moving air on its left, or westward side, thus again producing the first-mentioned phenomenon of a high glass on the right and a low glass on the left, so far as southerly winds are concerned. If this principle is considered with reference to a cyclone and the direction of the rotatory movement is also taken into account, it seems to be made clear that a cyclone is occasioned by the meeting and passing each other of a northerly and southerly current so that they pass each other on the left hand respectively.

When this occurs the low pressure on the left or east side of the north wind coincides with the low pressure on the left or west side of the south wind, and thus a depression is formed round which the wind rotates. It follows that the west and south wind is found in the south and south-east side of the storm,