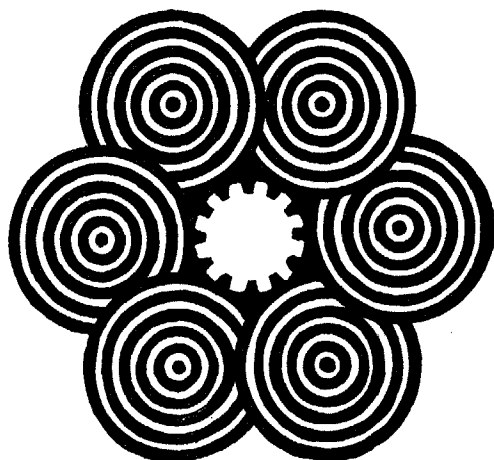


A NEW ILLUSTRATION OF "PERSISTENCE OF VISION."

By THOMAS WILLIAM TOBIN,Professor of Chemistry and Physics, Central University, Richmond, Ky.

The accompanying optical illusion, described and exhibited by Professor S. P. Thompson, of University College, Bristol, England, has been noticed by many of the European and American scientific journals, as a great curiosity. "If the illustration" (Fig. 1), says the inventor, "is moved by the hand in a small circle without rotating it, or if it is given the same motion that is required to rinse out a pail, the circles will revolve around their centres in the same direction that the drawing moves, and will complete a revolution as the drawing completes its circular motion. The central figure will also revolve, but in the contrary direction."

Fig. 1.



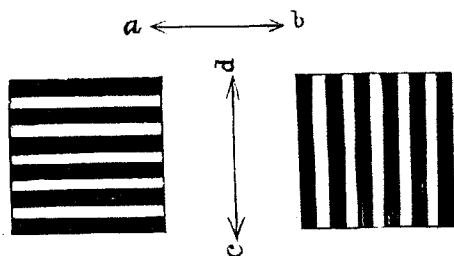
"No satisfactory explanation of these phenomena has as yet been given. It is suggested that the key to the mystery may perhaps be found in the property of the eye which Brewster and others call 'compensation'; that is, the tendency of a repeated or continuous movement to cause a sensation complementary to the real one. For instance, if we gaze at the rocks in a cascade and then at the cascade:

alternately, for a short time, the rocks will appear to move upward; or if we examine a stream below a waterfall, the water will appear to flow much faster in the middle than at the sides of the stream. If we look at the middle and sides alternately, the water will seem to flow backward."

This does not afford a satisfactory explanation of the phenomenon. The principle involved is undoubtedly that of "Persistence of Vision," or that property of the retina of the eye, of retaining any image impressed upon it for a perceptible interval of time. This interval of persistence "varies with the sensitiveness of the retina and the intensity of light" (Ganot), and has been found by Pleteau to average half a second.

Fig. 2.

Fig. 3.



Draw a number of thick black lines and equal white spaces intervening, horizontally and vertically, as in Figs. 2 and 3. If now these figures be moved quickly in the directions of the double arrow, *ab*, it is evident that, providing each black line in Fig. 3 replaces the adjacent white line in less than half a second, both images of black and white lines will be superimposed upon the retina, and the effect produced of a grey, indistinct appearance. The same motion will not produce this effect on Fig. 2, as there the similar lines will always superimpose, and the eye will retain the intensities of both black and white lines. Moving the figures in the same manner, but in the directions *cd*, these effects will be reversed, *i. e.*, Fig. 2 will be indistinct, and Fig. 3 bright and intense.

Now, applying these conditions to curved lines and circles, we have the same results; but, as there are no two continuous points in a curve or circle, the intense portions of the lines will be governed by the motion of the figure, and in a circle moved in a circular direction. The

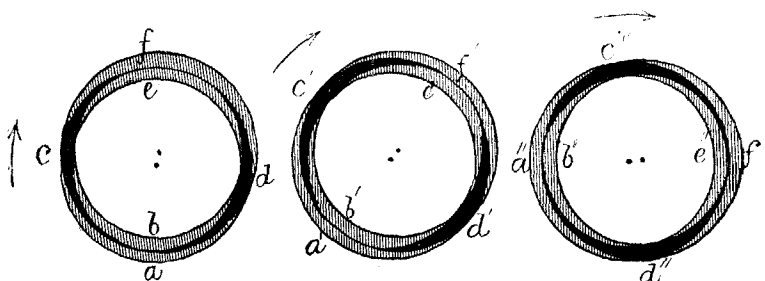
intense portions will partake of the circular motion, as may be explained by the following figures :

Assume that one of the black circles of Fig. 1, and represented by a, c, e, d , Fig. 4, is moved in a circular direction, as indicated by the arrow, if in half a second or less it arrived at the position b, c, f, d , there will be two intense or superimposed portions, c and d , the remainder of the figure being grey, or indistinct.

Fig. 4.

Fig. 5.

Fig. 6.



Let us follow the motion, and after another part of the revolution the circle will be as represented in Fig. 5, and again in half a second from that position the intense portions will be at c' and d' . At a third interval we will find the intense portions, as in Fig. 6, at c'' and d'' , and so on, but continuous throughout an entire circle.

It is the movement of these intense spots over the grey, or indistinct circles that lends the illusion of revolution. In the strict sense of the meaning, the circles cannot appear to revolve, because revolution of a perfect and uniform circle is imperceptible to the eye. It is essential that some prominent part or parts indicate the motion. The parts c and d are made prominent by their intensity, and revolve as shown. The same line of reasoning applies equally to the white as well as the black circles, in regard to their intensities.

This seems to be the rational explanation of the phenomena, which may be verified in a number of consequent experiments, too numerous to describe here.

Artificial Indigo.—Prof. Baeyer, of Munich, has discovered a systematic method for the artificial preparation of this valuable dye.—*Ind. Blätter*. C.