eight to ten Bunsen elements into the circuit they give the compass, when the machine is at rest, a deviation d , and if it is in action a deviation d' , absolutely equal to d . This equality proves that the resistance of the wires of the machine for a current derived from an exterior source does not change, whether the machine is at rest or in action. It proves, further, that the two effects of the machine and the battery are superposed and independent of each other. If we now suppress the battery and introduce into the circuit a burner formed of two unequal carbons, the one thick and the other slender, this want of symmetry suffices to determine a permanent deviation of the compass as if a battery had been introduced. The two systems of inverse currents given by the machine cease to be equal; that which sets from the thick carbon to the thin one prevails over that in the opposite direction. Hence there results a differential current, which is shown by the compass, and which is so much the more intense as the difference of thickness of the two carbons is greater.

ON THE MAGNETIC "AFTER-EFFECT."

By FELIX AUERBACH.

In all the magnetic theories of Poisson and others, the magnetic state of a body at any time is supposed to depend merely on the magnetizing forces at this time.

Under "after-effect" are understood two kinds of phe-

the force acting at present, a series of forces, $J_1 \dots J_p \dots J_s \dots$ acted previously, instead of the magnetization m , there would now be the very different magnetization m , the difference between them being the "after-effect" of the previous forces. J_1 is of importance in maintaining after-effect, so long as all the succeeding values of J lie between J_1 and i , but after any subsequent value of J lies outside these limits, it may be considered that no after-effect is due to J_1 . Again, of two previous forces which lie upon different sides of i , the second alone is of importance if it lies further than the first from i ; in every other case they are both of importance in determining the value of m ; it is never the case that the first alone is useful. Permanent magnetization of steel is a special case of "after-effect," and its laws are merely special cases of general laws. Just as it was found that, when forces followed one another discontinuously, certain intermediate forces are of consequence, so it is found that, if the force alters continuously, the rate of change is without influence on the after-effect—at least, the influence is small in comparison with the after-effect itself. If the magnetic force be increased suddenly, a magnetization results which decreases in time, at first quickly, then slowly, and approaches a constant value, which is, however, greater than the constant value produced after very slow production of the same force. The rate change of force is only of influence on the "after-effect" of the second kind, when it is so great that it causes an after-effect of the first

ment of these different spaces is always the same, but the intensity of their tints varies. The central space shows itself sometimes very clear, sometimes very somber; above and below, as far as the limits of the visual field, there is sometimes clearness, sometimes obscurity. It is the same with the space to the left; there is generally a vertical, almost black band, and the space to the right of that as far as its limit is almost always clear and ruddy. These appearances seem to M. Plateau to fill the whole extent of his ordinary visual field. He believes the distance at which they are small. These same appearances follow all the movements of the eyes as if they resulted from a modification of the retinas. It appears to M. Plateau that the two eyes do not participate in the same manner in the tints in question; but he is absolutely incapable of distinguishing what belongs to the one from what belongs to the other. He has not been able to establish any coincidence between the changes of the general tint and the work of digestion.

HYDROCYANIC ACID.

By C. BRAME.

HYDROCYANIC acid in vapor determines a scarcely visible turbidity in the white of egg or in a solution of albumen. Hydrocyanic acid dissolved in water precipitates abundantly pure albumen and its aqueous solution. The preservation of the bodies of animals poisoned with hydrocyanic acid is

STUFF PATTERNS, FROM THE BAVARIAN NATIONAL MUSEUM IN MUNICH.

nomena. The one, the changing magnetic state of a body during the action of a constant magnetizing force, or after the force ceases to act; the other being the dependence of magnetic state not merely on the amount of magnetizing force acting at the time, but on the amounts of these forces which acted before this time, and the previous conditions of the body. As to after-effect in elastic phenomena and in magnetism, the author mentions the work done by Kohlrausch, Fromme, Meyer, Warburg, and himself.

The author has already considered, in a previous communication, "after-effect" of the second kind. The general question which remains to be answered is, how does the present magnetization, m , depend on the magnetizing forces $J_1 \dots J_p \dots J_s$ respectively, which have acted at a previous time when the magnetic conditions were $M_1 \dots M_p \dots M_s$, and this he has tried to answer. In the present paper, as the question is a complicated one, he gives a qualitative answer, reserving for a future communication his numerous tables of experimental results and formulæ. The arrangement of his experiments was the same as in his first researches. The body operated upon was a hollow soft iron cylinder, $5\frac{1}{2}$ inches long, 0.69 inch in diameter, magnetized by means of a coil of wire. The following are some of his results: If the magnetizing force, i , following on a condition of no force, would produce the magnetization m_0 ; then, if besides

kind. Lastly: The magnetic after-effect is in no case very small in comparison with the magnetic effect itself, although it is always less, but between a value equal to the effect itself and zero it may have all values. It is not easy for it to approach the value zero. The author concludes by saying that no theory of the cause of the second kind of after-effect can be worked out till the phenomena of the first kind of after-effect are thoroughly mastered.—*Wiedemann's Annalen*.

A BLIND MAN'S VISION.

M. J. PLATEAU, who for the last forty years has been totally blind, has just published a little paper on the sensations which he experiences in his eyes. He states that he has constantly in his eyes the sensations of light; his field of vision is divided into spaces, of which some are very clear and others somber or almost black. These spaces are not precisely limited, but run into each other at their borders; but what is remarkable is that their general tint alternates between gray and reddish. For example, if it be gray M. Plateau perceives now, in a few hours it will be red; then a few hours later the gray again, and so on. The reddish tint is that obtained by mixing pale rose-color, or rather flesh color, with a certain quantity of black. The relative arrange-

ment of these different spaces is always the same, but the intensity of their tints varies. The central space shows itself sometimes very clear, sometimes very somber; above and below, as far as the limits of the visual field, there is sometimes clearness, sometimes obscurity. It is the same with the space to the left; there is generally a vertical, almost black band, and the space to the right of that as far as its limit is almost always clear and ruddy. These appearances seem to M. Plateau to fill the whole extent of his ordinary visual field. He believes the distance at which they are small. These same appearances follow all the movements of the eyes as if they resulted from a modification of the retinas. It appears to M. Plateau that the two eyes do not participate in the same manner in the tints in question; but he is absolutely incapable of distinguishing what belongs to the one from what belongs to the other. He has not been able to establish any coincidence between the changes of the general tint and the work of digestion.

PORCELAIN.

PORCELAIN is made of a material which becomes vitrified and translucent by burning. It is distinguishable from pottery in its specific sense by its glassy fracture, its clear ringing sound when struck, the homogeneity of its outer and inner structure, and its resistance to fire, water, and acids, hydrofluoric acid excepted.

Porcelain is said to have been invented in China in the