Persistence of the Different Colors on the Retina.

Light has been hitherto considered as divisible only into the various colored rays by single, and into polarized rays, by double refraction; a new distinction has been discovered, founded on the varied persistence of the impressions made by the different rays on the retina.

It has long been known that the impression made by light does not cease with the cause that produces it. And it has been found that luminous impressions repeated at intervals of time appear to the eye continuous. It is on account of such apparent continuity, that a stick lighted at one end and made to revolve rapidly round the other as a center, seems to describe a circle of fire. The apparent continuity of sensations which are in reality intermitting, is not confined to those connected with vision; sounds repeated at very short intervals appear to be uninterrupted. In fact, every sound, however sharp, is but a series of different vibrations.

The consideration of these facts leads to practical conclusions. If, in ornamentation and music, the sensation of a second color, or sound, may be produced before that of the first has disappeared, the co-existence of colors or sounds, which are primarily intended to act only in succession, must be kept in view; and the sound or the colors must be such as to produce in the one case musical, and in the other pictorial harmony.

M. Laborde has lately communicated to the Academy of Sciences researches on this subject in connection with colors; and the conclusions to which they lead are very curious. He has found that the retina decomposes the rays of light in a manner different from that either of the prism or the double-refracting crystal. These disperse the rays with reference to different points of space, the retina disperses them with reference to different points of time.

In the experiments which were made, the light of the sun was received on a mirror which reflected it horizontally through a chink formed in the shutter of a darkened chamber. This chink was about the tenth of an inch wide, and the fifth of an inch high Very near it, and within the chamber, was placed a metallic disk, around the edge of which were formed openings corresponding with, and of nearly the same dimensions as that in the darkened chamber. These openings were at considerable intervals; the disk was made to revolve by clockwork; and a means by which the operator, though at a distance, could moderate, accelerate, or arrest the revolution of the disk, was provided. Across the path of the luminous ray, and at the distance of about three feet, was fixed a plate of roughened glass, behind which the experimentalist observed the modifications of the light. The disk being set in motion, the luminous ray reappeared at certain known intervals. When it was made to reappear slowly, it seemed of a uniform white color; but when it reappeared at shorter intervals the edges began to be colored; and as the velocity of rotation was increased, the image passed successively through the following tints—blue, green, rose-color, white, green, blue. After the latter blue no increase of velocity produced anything but white.

It thus appears that some of the colored rays cause a more lasting impression on the retina than others.—*The Scientific Review.*

The Channel Tunnel.

A writer in a late number of *Chambers's Journal* enumerates no less than eight different projects for uniting England and France by uninterrupted communication. The first was proposed by a Frenchman named Mathieu, at the commencement of the century. His was a tunnel for a line of diligences. A few years later the plan, which had been lost sight of in the hostilities between the two countries, was revived by MM. Franchot and De Mottray, who proposed a cast-iron tube on the bed of the sea. M. Payerne suggested an improvement in a tunnel of brick masonry and concrete. After the introduction of railways a French engineer named Favre, proposed a tunnel for steam carriages. Two Englishmen followed with a proposition for a triple tunnel. In 1857 Thome de Gamond advocated a series of shafts, lighthouses, quays, etc., in connection with a tunnel. Five years ago, J. F Smith. an Englishman, planned a wrought-iron tube to be suspended by piers some forty feet beneath the surface, a gigantic Victoria or Britannia bridge, or tunnel, sub-aqueous. At present Mr. Hawkshaw, the eminent London engineer, is boring to ascertain the character of the strata beneath the channel, to demonstrate the feasibility of a tunnel; while Mr. Fowler, the engineer of the Metropolitan Underground Railway, of London, proposes immense ferry boats sufficient to take a whole train on board.

This last appears to be the most feasible and practicable scheme. The difficulties to be surmounted in the excavation of a tunnel, its cost, the danger of injury to the structure, and the popular opposition to travel by such a route, are obstacles which are almost insurmountable.

SCHNEIDER'S ARTIFICIAL LEG.

The casualties of the war have created a great demand for artificial limbs, which has directed invention toward their improvement. The annexed engraving gives a view of a light and apparently successful substitute for the natural leg where the amputation has been performed below the knee joint

The sheaths, A, envelop the leg and stump, and are secured by lacings or some equivalent device. Attached to their sides are supports of iron or steel, jointed at B, to give the proper movement at the knee. The lower supports are attached to the sides of a foot, C, having a swell to compare with that of the ankle joint on the natural limb. This foot is intended to be worn in a boot or shoe. The movements of the foot are governed by strips of shirred rubber, D, one attached to the instep and two others to the heel. They can be adjusted by means of buckles, as shown.

This improvement was patented by Jacob Schneider, Aug. 15, 1865. State and county rights and further particulars can be obtained by applying to Jacob Fricke, 110 East Pearl street, Cincinnati, Ohio.

J. NORTON writes to the editor of Saunders' *News Letter*, Dublin, Ireland, that he used an ogival-headed iron shot, in a trial at Woolwich Arsenal, more than thirty years ago, and the flat-headed steel shot at the same time. Specimens of these projectiles he deposited in the museum of the Royal United Service Institution. He says he cast iron shot in iron molds in 1826, thereby antedating Palliser twenty years.

THE British Admiralty have adopted zinc as a sheating for the bottoms of the new iron ships now building.

THE Census Bureau estimates the present population of this country at 35,000,000.

Correspondence

American Iron and Steel.

MESSRS. EDITORS:—I notice in your issue of Oct. 6th an article on "Steel from American Iron," ascribing the deficiency in quality of American steel to the quality of iron used. Of the Cranberry ore, of North Carolina and East Tennesee, you may have heard. This ore will make an iron as tough as the best Swede, but it is very far from market. In the good, slow, old State of North Carolina there are ores from which can be made an article of iron that may be converted into a steel as good as any English, and these ores are easily accessible. I have now in my possession samples of such ores and will be pleased to give them to any one who may send their address to me. The wrought iron made from the ore in the ordinary Catalan forge, stood a test, in Washington City, of 72,000 lbs. to the cubic inch. The mine is located convenient to transportation, and one-third of the ore bed with 15,000 acres of well-timbered land, is offered for sale. My opinion is that the pig might easily be delivered in New York for $30 per tun, including all expenses.

Further east, on the Cape Fear River, is an immense deposit of iron ore, pronounced to be the largest east of the Missouri Iron Mountain. It was worked by two companies during the war; both making pig metal. It is immediately on the Cape Fear River. with two or three locations of great water power near it; navigation to Egypt, where connection by railroad to Fayetteville is perfect and cheap. The ore is specular oxide of iron.

One of the furnaces which worked this ore is worthy of mention from its peculiar construction, It was designed and constructed by two practical Scotch iron makers, part owners. The boshes were lined with agalmatolite, silicate of alumina, and were built up their hight of stone. Above was a mere pen of logs strongly dovetailed, the inner lining of the furnace brick, and between the logs brick clay was packed. This furnace cost about $100,000 in Confederate money, including houses, opening, canal boats, water wheel, etc Its capacity was about four tuns a day. The iron was pronounced the best for car wheels ever obtained from American ore.

The other furnace was located twenty miles from the bed, was worked by steam power, but for some reason never made quite so good iron. It is still in operation. The first was burned after Lee's surrender.

H. E. C.

Preservation of Wood.

MESSRS. EDITORS:—I notice in your last paper that the remarks I furnished you have called forth a lengthy communication from a correspondent, who partially agrees with me concerning the effects of charring the wood, but feels himself justified—by reference to weighty authorities—in being skeptical as to my other assertions. I will not occupy your valuable space by controverting such authorities as Ure and others, but will endeavor to show your correspondent how he can convince himself, by experiment, of the fact that living organisms (fungi or animaculæ) are the originators of all fermentation and putrefaction, and that where these germs have been destroyed, and the access of fresh germs is shut off, no putrefaction or fermentation will take place.

Take two glass bottles and fill them partially with a fluid that will easily ferment or decompose, carefully cork each bottle and insert in each a glass tube about six inches long, drawn out to a point. Bring the contents of both bottles to the boiling point, and after the steam has blown off, close the tubes by a blow-pipe quickly.

Now, having hermetically sealed up your bottles, the fluid contained will remain good for any length of time, because, first, the germs are all destroyed, by boiling, and, secondly a vacuum has been formed. If, after some time, the glass tube is broken so as to admit a quantity of air as before, so that it may become thoroughly heated by slowly passing through the red hot tube close the opening and let this also remain for any length of time. On examina-