This proved to be the case, and on gently pressing pieces of wood against the red hot platinum wire, especially when aided by a slight sawing movement, the wood was divided in any required direction as by a handsaw, and, of course, without any effort of skill or appreciable expenditure of muscular power. By arranging the wire with handles or other means, so as to guide it readily, the lumber, whether in trees, logs, or planks may be cut easily as desired. There is here, therefore, a simple and easily applied force, which, in a child's hands, may be employed to fell trees, divide them into logs, and, in short, perform all the operations of the saw and the ax. The surface of the wood where thus divided is, of course, slightly charred, but the black layer is very thin, and for many purposes not disadvantageous, as it is known to preserve timber. The battery employed need only be of the simplest character, as quantity, and not intensity, of current is required.

THE KAOLIN OF THE UNITED STATES.

Dr. Lewis Feuchtwanger recently read, before the Polytechnic branch of the American Institute, a paper on this subject, from which we take the following:

The china clay, commonly called kaolin, occurs in very large deposits in the United States, particularly in South Carolina and Georgia, and its production offers remunerative results for the manufacturers of porcelain, manufacturers of paper and paper hangings, earthen and Rockingham ware, paint manufacturers, frame makers, molders, and many other artisans. The paper clay has been mined in South Carolina for a number of years, and brought to this market, where it always finds ready sale. More than 3,000 tuns have been landed here during this year, and 10,000 more are already engaged to be delivered for the extensive branches just mentioned. But there are many more deposits in that State capable of producing a million of tuns with the most simple *modus operandi*, consisting of cutting or digging the white clay, which is either directly exposed on the surface or within a few feet of the alluvial soil, drying the lumps by exposure to the sun for one or two days, packing into tierces holding about half a tun, and delivering it to the railroad within a mile of the pit. The range of the sand hills in the above States, which contain those extensive clay deposits, is, in a geological point of view, of great importance, for they are all usually found adjacent to the rivers, and more developed near the larger streams than the smaller ones; the sand hills appear to be accumulations of sand, produced by aqueous agency, during the period when the lower boundary of the primitive region constituted an ancient sea beach. The clay strata of various thicknesses are generally considered, by geologists, as the results of decomposition of the felspathic rocks, or of felspar, forming a component part of the granitic and gneissoid rocks of the azoic period during their alteration in the cenozoic time by means of Plutonic agency; while the sand hill formations arising from the decomposition of the tertiary and post tertiary rocks, and including the pleocine, miocene, and eocene formation, took place under Neptunic auspices, as the specimens exhibited, gathered in the sand hill regions, clearly prove. The granite is known everywhere to underlie the marl and clay beds, and we find the same phenomena over an extent of 1,500 miles, beginning in Vermont, crossing over to New York, forming large deposits in New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North and South Carolina, and Georgia. Further, while examining, in Alabama, the triassic rocks of the cretaceous period, we are fully convinced that the great supply of organic remains, the mineral composition and its interposition, prove their true position to be in the geological periods just mentioned.

It is a very remarkable fact that the white clay deposits are mostly found near the surface of the earth. But still more remarkable is the existence of those large clay deposits, so perfectly free from foreign admixture, and even of remains of the felspar from which it originated. Analysis of an orthoclase shows a composition of 63 silica, 17 alumina, 3 soda, 9 potash, and 1 water, while albite and oligoclase have about the same composition, with certain differences in the bases. None of the felspar contains over one per cent of water, while the analysis of the white clay from South Carolina shows the presence of 12 per cent water, and not a trace of potash or soda, and only 2 per cent lime and magnesia, and the silica and alumina in about equal proportion, namely, 44 per cent silica and 39 per cent alumina. In its physical character, the alteration is just as remarkable. Neither mica nor quartz can be detected by the eye or the touch. New Jersey clays and the English china clay have the same peculiarity, as proved by their analysis, and a grave question arises how this metamorphosis took place, and where have the alkalies of the pre-existing felspar gone, and how have they disappeared and been replaced by water? In looking among the elements for an agency, we find carbonic acid the only element that could have produced this metamorphosis: but we are puzzled to know by what process and at what period of decomposition such a change has taken place.

The white clay of South Carolina appears to be fully equal in quality to the famous English china clay, which is largely imported from Cornwall, England, and so extensively used in the arts. But there it is not found in such large masses as in South Carolina, where the writer examined a number of deposits of acres in extent, and from five to ten feet in depth. Since one yard square yields 300 cwts. of the fine and pure clay, the supply is inexhaustible. The peculiar appearance of a thin crust covering the sand hills is, to the observer, of great interest; for it gives undeniable proof that the transformation of the metamorphic or crystalline rocks, during the azoic period, took place under volcanic auspices, and that the result of the decomposition must have undergone several other alterations before the present condition of the sand and clay was attained.

A ferruginous sandstone, resembling fused masses from a great heat, and assuming thin crusts with fantastical figures, is seen all along the sand hills, just below the alluvial soil, and above the sand and clay hills, and I have seen the same crusts of oxide of iron on the railroad from Washington to Baltimore, lying over the sand strata in that neighborhood.

In Georgia, within the compass of the Blue Ridge, extensive deposits of blue or fire clay, resembling the New Jersey blue clay, are found, which are accompanied by a brown mineral, resembling amber, but properly a brown lignite, which, when freshly broken, has the odor of petroleum; and also accompanied by large quantities of oyster (*gryphea*) shells and other forms.

The burrstone or millstone grit is also found contiguous to the clay beds, or at the sand hills, where I found a large mass of several hundred pounds, composed all of silicious shells within the red sand strata.

A beautiful sandstone with oxide of manganese in black spots, and which is sometimes called leopardite, from its resemblance to the skin of a leopard, is here presented. It is from the Blue Ridge, and may be made into a fine ornamental stone.

The consumption of china clay or white clay is very large and daily increasing; statistics show that during the last six months about 2,000 tuns of English clay have been imported in this port. South Carolina has furnished for the paper makers and stainers in New York, Boston, Philadelphia, and Baltimore 2,000 tuns during the same period. The Trenton (N. J.) potteries consume 20,000 tuns per annum. The Ohio potteries in Liverpool and Cincinnati consume annually over 40,000 tuns. The price of the English clay averages $30 gold per tun, while the American can be had for a little over half that price in currency.

In the following analyses of the English china clay, Stourbridge and German clays, and that from South Carolina, New Jersey, and Missouri, we shall see that the Southern clay is in every respect equal to the Cornwall clay so largely imported into the United States:

English best white clay, washed.		South Carolina white clay, unwashed.	
Silica	46·32	Silica	44·46
Alumina	39·74	Alumina	39·82
Lime	0·36	Lime and magnesia	1·86
Magnesia	0 44	Oxide of iron	0·60
Protoxide of iron	0·27	Titanic acid	0·94
Water	12 67	Water	12·10

South Amboy (N. J.) white clay, unwashed.

Silica	43·20	Water	14·25
Alumina	39·71	Potash, zirconium, and iron	2·50

English Stourbridge clay for glass pots.		German clay for pots.	
Silica	65·10	Silica	50·20
Alumina	22·22	Alumina	34·13
Potash	0·18	Potash	0·39
Lime	0·14	Lime	0·30
Magnesia	0·18	Protoxide of iron	·37
Protoxide of iron	1·92	Water	13·70
Phosphoric acid	·06		
Water	9 86		

Chemical Action of Light.

Professor Roscoe lately delivered the first of four lectures at the Royal Institution on the "Chemical Action of Light." He began by showing how a chemical change in certain gases, liquids, and some few solids will change their colors and their action upon waves of white light. He said that sometimes an approximation or separation of particles may be set up by mechanical means, as in the case of a mixture of chlorate of potash and sulphur, which gives a series of loud snaps when a little of it is struck with a hammer. It is dangerous to detonate this mixture in any but small quantities. Heat alone will cause explosions in some cases; for instance, when a flame is applied to a mixture of oxygen and hydrogen gases. In like manner light, in some instances, has the power of promoting the approximation or separation of particles. The effect of light on various bodies is by no means the same, and its action on chemical substances can be mechanically explained by the aid of the law of the conservation of energy—the energy of the interstellar ether is expended in acting upon the substance molecularly changed.

As an example of a chemical change which could be produced by light, he placed a mixture of oxygen and chlorine enclosed in a very thin glass bulb, inside a cylinder of thick glass. The bulb had been filled in the dark, and kept in a dark box until required for the experiment. Then he placed a glass trough full of water behind the cylinder, and burnt some magnesium on the other side of the glass trough so that the rays of light had to pass through the water to get at the bulb. The light caused the mixed gases in the bulb to explode; it was not the heat of the flame which caused the explosion, because the water sifted out all the heat rays, with exception of the very small proportion contained in the visible rays from luminous sources. He said that green light will very slowly decompose a mixture of chlorine and hydrogen; the power of decomposition increases as the violet end of the spectrum is approached. Strangely enough, there are two points of maximum action in the chemical part of the spectrum, and between these two points the says have less chemical action on the mixture.

Professor Roscoe next told how the action of light upon salts of silver gave rise to the beautiful and wonderful phenomena of photography. Although this chemical action of light was noticed as early as the sixteenth century, it was not until 1777 that the Swedish chemist, Scheele, explained the philosophy of it, and pointed out that the hydrochloric acid was set free, leaving a black deposit of finely divided silver; he first proved that the action took place in the blue and not in the red portion of the solar spectrum. The lecturer then proved by experiment that chloride of silver was blackened by the blue and not by the red rays.

He said that the decomposition of carbonic acid under the influence of sunlight, by the green coloring matter of leaves, was another example of the chemical changes sometimes produced by light. The earliest experiments on this subject were made by Priestley in 1790. This acute reasoner proved by experiment that it was only in the presence of sunlight that the evolution of oxygen from plants takes place. He took a large inverted vessel full of water charged with carbonic acid and placed a living plant inside; then, in the presence of sunlight, bubbles began to form on the leaves of the plant, then to rise to the top of the vessel. On examination the gas thus produced was found to be pure oxygen. Priestley took a candle and burnt it in a closed volume of air under a bell jar, until the candle went out after consuming most of the oxygen and liberating carbonic acid. He next placed a fragment of a growing plant in the jar and exposed it to sunlight; in course of time the air was rendered pure again, so that another candle could be burnt in it, and the experiment repeated over and over again an indefinite number of times. Professor Roscoe proved this by showing that a taper would burn brightly in a glass jar containing growing musk, though when the musk was first put in the jar, the air had been made so impure by the burning of a candle in the glass vessel that it would not then support combustion. Priestly tried many of his experiments with mint, and not a few of them with other vegetables; he found spinach to be most effectual in restoring oxygen to air under the influence of light.

The existence of the ultra red rays of the spectrum was first demonstrated by Herschel in 1800. The existence of ultra-violet rays was demonstrated later still by Wollaston and others. It was discovered that chloride of silver became blackened beyond the range of the visible rays of the spectrum. It was found that the lines of the chemical part of the spectrum could be photographed, and that the photographs of them, taken by Rutherfurd of New York, agree with the drawings of them made by hand by Kirchoff, although in a few cases they do not agree in breadth and in intensity. The chemical rays of the spectrum differ from each other solely in wave length and amplitude of vibration.

$10,000 Reward for Improved Railway Signals.

An offer of the above amount is made by parties in Boston for the invention of devices that some of our ingenious readers can certainly supply. The offer is as follows:

To the Editors of the Boston Daily Advertiser:

There are in the United States several millions of persons, sick and well, living along the lines of the various railroads and near manufacturing establishments in populous towns, who are disturbed day and night by the discordant shrieks of the modern steam whistle. Owing to the gradual introduction of this apparatus, the public has learned to tolerate it, but we venture to assert that if it could have been introduced suddenly as we hear it to day, no community would have consented to its use. These unearthly sounds are made in manufactories at early dawn, at noon and at night, to call their operatives to work and to meals, and on the railroads to warn passengers on the highways, and to give notice to switch tenders on the approach of trains. It is not necessary to describe them, since they are familiar to all, and all are more or less affected by them. Is there no remedy for this increasing evil, or cannot a substitute be found which will answer all the purposes of the steam whistle, without annoyance to the public, and with safety to travellers on the railroad and on the highway? Believing that such a substitute can be found, and to encourage experiments in that direction, we hereby agree to pay the sum of ten thousand dollars to any one who shall, within two years from January 1' 1873, invent a system of signals which shall supplant the use of steam whistles on railroads, and which shall be pronounced by judges, hereinafter named, to be free from the evils of the present system, and which shall be attended with no discomfort to passengers on the trains, or the highways, or to residents along the line of the railroads. One fifth of the amount thus pledged shall be paid to the author of such invention at any time within the period specified, whenever its claims shall be substantiated by the said judges, and the balance whenever the invention shall be adopted and used by a majority of the railroad companies in New England, provided such adoption be previous to January 1, 1877. The judges in these premises shall be the Chairman of the Massachusetts board of railroad commissioners, the President of the Boston and Albany and Boston and Maine railroad corporations, the Professor of civil engineering in the Massachusetts Institute of Technology, and the chief locomotive engineer on the Boston and Albany railroad. If any of the above named gentlemen shall decline to serve as judges, the donors reserve to themselves the right of naming substitutes.

Communications may be addressed to "Committee on Railroad Improvements," care of *Boston Daily Advertiser*, Boston, Mass.

The Brewing Interests of the United States.

The twelfth annual convention of the chief association of the brewers of the United States was recently held in this city. From the opening speech of the President, Mr. Henry Clausen, we learn that there are at present three thousand breweries in the country, employing a capital of over one hundred million dollars and giving employment to thousands of people. The trade yearly consumes twenty-three million bushels of barley and over eighteen million pounds of hops. The revenue derived by the United States from this industry amounted in 1871 to seven millions eight hundred thousand dollars, being an increase of over six million dollars since 1863.