For the Scientific American.

New Chemical Law.

No. 4.

All the conditions required by this law cannot at present be given, because there are many substances with which we are but little acquainted. The result of future experiments must, however, coincide with the requirements of the law.

All those essential oils, which are considered as having the composition of C5, H4, I consider as aggregated compounds produced from one radial. By classifying them according to the requirements of the law, that is, by their specific gravities, boiling points, &c. we should obtain their true composition. The specific gravities of their vapors would be of the utmost importance in the calculation.—This law shows the probable reason of the solidity of caoutchouc, a substance possessing the same empirical composition, as the above named essential oils, but is probably a substance of the highest state of aggregation.

Chysene C12, H4, solid.
Idrialine, C21, H7, solid.

The radial of this series is probably C3, H.

	Sp. Gr.	B. Pt	S. G. Vap
Napthaline C10, H4,	1,048	413°	4,488.
Paranapthaline C20, H8,			

Chemists have not yet decided on the true formula of the above substance The specific gravities of their vapors would decide this point precisely. The specific gravity and boiling point of paranapthaline are not given but they are greater than those of Napthaline There is no doubt but many other substances belong to this family which have have not yet been examined.

Chlorine is capable of being substituted for the hydrogen in the above substances, according to the Theory of Types and Substitution by Dumas, which does not in the least interfere with the operation of this law, buti s rather a help, as the conditions required by the law remain the same.

The following gives an instance of the compounds of an aggregated series with hydrogen, forming hydracids, although the substances composing the series have not been discovered in their uncombined state. The conditions required of compounds by this law, should therefore be existent here. Unfortunately the specific gravities and boiling points of these substances have not been given. Future experiments are wanting to show the application of the law to this example.

Mellitic Acid C4, O4+H.
Croconic Acid C5, O5+H.
Rhodizonic Acid C7, O7+H.

While the boiling points of the above class of substances must increase, their specific gravities may decrease; whether they increase or decrease however, it must be accompanied by a constant regularity. The carbonic oxides are the substances composing the aggregated series, and are probably derived by the aggregation of the radical C O.

Many other instances can be given illustrating the truth of the law, but I shall conclude the example by the introduction of a class highly important, as it is a class with which chemists are more particularly acquainted, and of which the specific gravities, boiling points, &c. have generally been previously calculated. I have reference to the radical C H, and the substances produced by its aggregation.

	Sp. Gr.	B. Point.	
Olefiant Gas 2C, H			gas.
Etherene 4 C, H.	,627		fluid.
Amilene 10 C, H.			fluid.
Cetene 32 C, H.		527°	fluid.
(No name) 33 C, H.			fluid.
" 34 C, H.			fluid.

All equicarb hydrogens may be included in the above series. It may be observed that as the radical aggregates, the general density of the substances produced increase, thus the first of the list is a gas: the next, however, partly partakes, both of the nature of a gas and a fluid, it being a gas at common temperature, but changes into the fluid state by the abstraction of its heat. The rest are all fluids and increase in their specific gravities as the aggregation proceeds. The boiling points also agree with the conditions required, for it is well understood that if a substance exists as a gas at common temperatures, then must its boiling point be far below common temperatures, consequently the first two substances, which exist at common temperatures in the state of a gas, possess boiling points far below common temperatures. The third substance, Amilene, is fluid at common temperatures, consequently its boiling point must be greater than that of Etherene, and so we pass on until we arrive at Cetene, which possesses a boiling point as high as 527°. Upon examination, the specific gravities of their vapors will be found nearly proportional to their atomic weight. S. N.

Bridgeport, Conn.

[To a great number of our readers, the essays we are now publishing on Chemistry, will appear like lectures on Greek. This is owing to a want of general knowledge respecting the terms and symbols that are used to designate this and that substance. We would advise our readers to get an elementary work on Chemistry and master the terms—the first thing that should be done in the acquirement of any science. We urge this upon our readers for we desire to see a more general diffusion of chemical knowledge among our people. Kane's Chemistry is a good work and will be found very instructive, and it can be purchased at almost all the Book Stores.—Ed.

The Solubility of the Oxides of Iron, Copper, and Cobalt, in Caustic Potash.

In making use of the apparatus invented by M. Liebig, for the determination of carbonic acid, M. Volkir of Berlin, Prussia, found that the solution of caustic potash employed, was at first quite clear, contained, after the passage through it of carbonic acid, a brown floculent precipitate of oxide of iron. Some direct experiments, made with a concentrated solution of caustic potash and oxide of iron, recently precipitated, confirmed the nature of this substance: consequently, M. Volkir recommends, for the separation of alumina and oxide of iron, a solution of caustic potash, and moderately concentrated (if the solution be too diluted the alumina will be but partially dissolved.) The oxides of copper and cobalt dissolve in large quantities in caustic potash, so much so that we can even employ the solution of this first named oxide to determine small quantities of grape sugar mixed with cane sugar, which reduces the detoxide of copper to the state of protoxide. In order to assure himself of the correctness of the statement of M. Berzelius, that the solubility of oxide of copper in caustic potash was due only to the presence of organic matters M. Volkir acted with the greatest possible precaution; he states, however, he found his experiments fully confirmed. The solution of the oxide of copper in caustic potash, may be diluted with water, without a separation of the oxide of copper. When a current of chlorine is passed through a solution of the oxide of copper, in caustic potash, the liquid assumes a deep green; but the moment that the alkali is completely saturated with chlorine, the combination which was formed is decomposed, the oxide of copper is precipitated, and chlorine disengaged.

Cure for Toothache.

Dr. Arnott, of Brighton, says in the London Lancet. "A degree of cold below the freezing point of water is, I believe, a new agent in therapeutics, which would, probably, be usefully employed for various other important purposes. A solution of salt, of a very low temperature, by acting on the exposed nerve, might at once, and permanently, remove toothache.

Iron pipe compared with Wood.

A pipe of cast iron 14 inches diameter and three quarters of an inch thick will sustain a head of water of 600 feet. One of oak, 2 inches thick and of the same diameter will sustain a head of 180 feet.

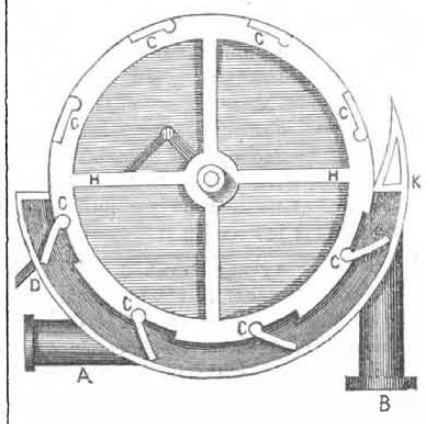
History of the Rotary Engine.

Prepared expressly for the Scientific American.

COOK'S ROTARY ENGINE.

This drawing and description is taken from the transactions of the Royal Irish Academy for 1787, and was the invention of a Mr. Cooke of Dublin, we believe.

Fig 8.



On the circumference of a wheel eight vanes or flaps are attached by joints, which are formed to open somewhat more than half of their circumference. During the revolution of the wheel the valves, which are on the lower half of the circumference, hang in a vertical direction by their own gravity. C C C, are the valves or flaps; B, is the tube which admits steam from the boiler; A a tube leading to the condenser. K K, is the case in which the wheel H H, is enclosed—this case is to be steam tight. The wheel being supposed in the situation in the figure, the valves prevent any communication between the boiler and condenser. Steam is now admitted at B and, passing on C C, forces them forward in its passage to the condenser and produces movement. The condenser is worked by a crank in its axis, and a rod D is extended from it which keeps a constant vacuum in that half of the steam case:—"by this means a power is added to the steam equal to the weight of the atmosphere; so that, when the force of the steam is only equal to the pressure of the atmosphere, and the valves are six inches square, the wheel will be forced round by a power equal to 531 1-4 lbs. placed on its circumference."

The construction of this machine is very poor and its operation impracticable. The South of Ireland has been singularly deficient in mechanical invention and discovery, although she has produced some splendid artists. The North of Ireland which claims a different paternity from the South, has on the other hand been very greatly distinguished from mechanical invention, but on the whole Ireland has done nothing in inventions to the number of the people and to their well known quickness of learning when an opportunity of a proper education is offered.

Attraction of Cohesion.

Particles of matter, when brought close together, or within insensible distances, have a tendency to cohere or stick together. This is termed the *attraction of cohesion.* Under the influence of this attraction particles of fluid matter, arrange themselves around a centre and take a globular form. The dew drop, suspended from the point of a thorn is a familiar example of matter thus acting. If two such drops are brought together they will instantly unite, a new and common centre will be established for both and they will resolve themselves into a new mass equally globular as before.

Attraction of Gravitation.

Particles of matter have a tendency to move or be drawn towards each other, called the *attraction of gravitation.* If we take two fragments of cork, no matter how small and set them afloat in a cup of water, we see the operation of this law. If kept a considerable distance apart, the impediments to their mutual attraction being too strong, they will not come together. But if brought within a short distance of each other we shall observe them begin mutually to exercise an influence over each other, and immediately they will rush together and so remain.

A Metal that expands most in Cooling.

Lead 9 parts, Bismuth 1 part, Antimony 2 parts.

To Remove Rust from Polished Steel.

Rub the spots with any kind of soft animal fat, and lay the articles by, wrapped up in thick paper for two or three days; then after cleaning off the grease with a piece of soft flannel, rub the spots well with powdered rotten stone and sweet oil, after which the polish may be restored by rubbing with powdered emery on soft leather; and the process may be finished with finely powdered chalk or magnesia.—*Ex.*

A better plan is to take soft soap and rub the knives, &c. on a board with rotten-stone, and afterwards polish up with Tripoli. Charcoal ground to powder is one of the best things ever discovered to clean knives. This is a late and valuable discovery.

How to Plant Chesnuts.

The plan of raising the chesnut is this: the nuts must not be suffered to become stock dry. Plant them in the spring of the year. The first winter protect them from the frost, or they are apt to be killed by the freezing. The next spring transplant in the following manner: Select a dry soil, dig a hole 18 inches deep, 3 feet wide: fill it up with small loose stones and clay to within six inches of the surface; set your tree on that; take care of it and it will grow well, and in four years bear nuts.

The chesnut should be more attended to, than it is—it is valuable food and very nourishing. In Italy the chesnuts grow to the size of small apples and are used as food by the peasantry.

Tides.

The difference in the the time between high water averages about 49 minutes each day.

Baked Apples are greatly improved by being baked in a bright tin or earthen plate, with a little water in, and a small quantity of sugar sprinkled over them.