



For the Scientific American.  
New Chemical Law.

No. 5.

This chemical law also applies to the compounds of an aggregated series with other substances, full as well as to the aggregated series alone, as may be seen by inspecting the properties of the following compounds. According to the condition required by the law, each substance comprised in an aggregated series must unite with an equal number of atoms of oxygen, to form an acid; and this it may be seen is the case with the aggregated series last given. All equi-carbohydrogens, in uniting with oxygen to form a definite acid, unite with precisely four atoms.

The following example shows a series of acids, formed by the union of oxygen with each substance comprised in the aggregate last given; and also acids which are compounds of equi-carbohydrogens, not given in the previous example because not recorded. There is no doubt, however, that if their acids were distilled in contact with lime, a carbohydrogen might be produced, the same as in the case with the generality of acids.

	S. Gr.	B. Pt.
Formic Acid $2\text{C H} + \text{O}_4$	1,235	212° fluid.
Acetic Acid $4\text{C H} + \text{O}_4$	1,063	240° fluid.
Butyric Acid $8\text{C H} + \text{O}_4$	,976	318° fluid.
Valerianic Acid $10\text{C H} + \text{O}_4$	,944	347° fluid.
Cocinic Acid $7\text{C H} + \text{O}_4$		solid.
Myristic Acid $28\text{C H} + \text{O}_4$		solid.
Palmetic Acid $32\text{C H} + \text{O}_4$		solid.
Margaric Acid $34\text{C H} + \text{O}_4$		solid.

Here is a case which, as far as it goes, is complete in every particular. It may be recollected, that in speaking of the properties of the compounds of an aggregated series, it was mentioned that their specific gravities might increase or decrease, according to the nature and specific gravity of the substance uniting. In this case it may be seen that the specific gravities decrease, as the series increase in a regular manner. The specific gravities of the four remaining substances should be less than the four whose specific gravities are given. The boiling points also increase with the series in a regular manner, and therefore by the law, the boiling points of the four remaining substances should also be on the increase, and greater than those of the first four whose boiling points are given. It may also be noticed that there is a gradual increase of density. Thus Formic acid the first substance in the series, is a fluid, but as the series increase, the substances produced exhibit the properties of a solid. Thus while the first four substances are fluids, the remaining four are solids, which is in conformity with the conditions required by the law. The chemical properties of those substances situated nearest to each other are strikingly similar, which also agrees perfectly with the conditions required; thus it is well known that the Formic and Acetic acids closely resemble each other; and although the chemical properties of the substances composing the series, gradually differ as the series increase, yet when any two are taken, closely situated to each other by their composition, it will be found that they possess similar chemical properties. This similarity of chemical properties is highly characteristic of either an aggregated series or its compounds, although it gradually differs as the series increase.

The following is an example of the compounds of the foregoing aggregated series, with one atom of water, and are generally known as Ethers. All of the substances comprised in that series do not unite with water, at least they have not been discovered. The reason that they do not all unite with water, may be attributed to the 11th article or condition of the properties of an aggregated series, which says that all those substances situated the highest in the list, generally have the least affinity for any particular substance,

consequently those situated the lowest in the list have a greater affinity for water than those above them. If any Ethers of the higher aggregated compounds are in future discovered, they can be easily classified.

S. Gr. B. Pt.

Oxide of Methyl  $2\text{C H} + \text{H O}$ . gas.  
Oxide of Ethyle  $4\text{C H} + \text{H O}$ . 725 76° fluid.  
Oxide of Amyle,  $10\text{C A} + \text{H O}$ . (unknown to exist.)

In this instance it may be seen that the boiling points also increase with the series, as the first substance being a gas at common temperatures, must already be considered by the laws of chemistry as in a boiling condition.—Now the second substance boils at 76° and there shows that the boiling points increase with the series. We can tell nothing by the specific gravity, as only the specific gravity of Oxide of Ethyle is given. The property of the density increasing with the series is perfect, as may be seen upon examination.

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#### History of the Rotary Engine.

Prepared expressly for the Scientific American.

#### BRAMAH'S ROTARY ENGINE.

This is one of the inventive Bramah's rotary engines, he having obtained three patents in 1790. The patent was taken out jointly with Mr. Thomas Dickinson.

FIG. 9.

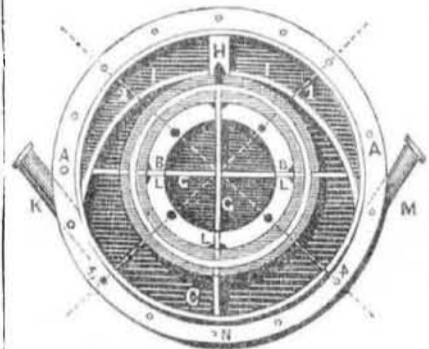
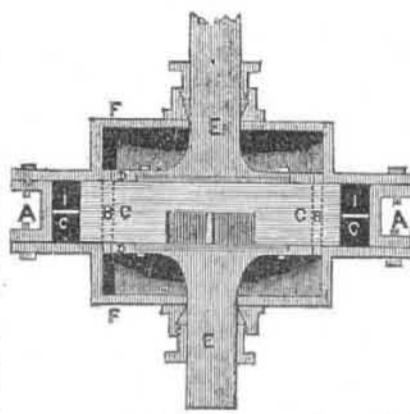


Fig. 9 represents the plan of one of these engines, and fig. 10 a section. A A and B B, show the ends of two short cylinders or rings of different diameters, one placed in the centre of the other. C is the channel or circular groove, formed between the two circles. The ends of the cylinder or ring B B, are shut up by two flat plates D D, as shown in Fig. 10; to these plates is joined an axis or spindle E E, which axis or spindle passes through the ends or caps F F, which encloses the ends of the cylinder or ring A A, and which is made air-tight by means of a stuffing box in the usual way. By this axis or spindle the cylinder or ring B B, may be turned round from without, any external power being applied for that purpose; or this axis or spindle may be applied to give motion to any other machine, when the cylinder B B, is turned round by any power or force acting from within. In the cylinder or ring B B, are fixed two sliders, G G, crossing each other at right angles in the centre where they are notched or half spliced, so far as to allow them to slide backwards as much, at least, as the diameter of the channel or groove C. The length of each of these sliders is equal to the diameter of the cylinder or ring B B, and one diameter of the channel or groove C; so that the points which perforate the extremity of the cylinder or ring B B, when they are pushed out into the channel or groove, may entirely fill the same, similar to a piston working in a common cylinder; in order that, when the cylinder B B, is turned round, the channel or groove may be by that part of the slider totally swept or emptied. In this channel or groove is fixed the partition H, which fills the same in that part, and, by its being fitted against the periphery of the wheel B B, prevents the passage of any fluid that way round the channel, when the caps or ends are screwed down. On each side of the partition H, is fixed a rib I I, or piece of such a shape as to perfectly fit the circle B B, one quarter of its circumference, between the dotted lines 1 2; and the remaining part is continued in a shape inclining to the circle of the greater cylinder A A, with which it forms an easy juncture at the quartile points, 3 4. When the cylinders B

B, with the sliders, are turned round in either direction, the inclined parts of the ribs I I,

FIG. 10.



force the opposite end of the sliders G G, successively into their channel or groove, where they are obliged to remain during one quarter of the revolution, being kept in that position by the circular part of the rib between 1 and 2. K M, are two pipes of any required diameter, which may be inserted into the channel or groove, in any direction the situation of the machine may require, between the points H 3 and H 4. The sliders are rendered sufficiently tight at their junction with the channel, by means of oakum or any other flexible material, being forced into the cavities made for that purpose at the parts L L L; and also the partition H in the same way. The cylinder or ring B B, being thus armed with the sliders, and the caps or ends, F F, screwed on by the flanches at A A, the machine is complete and ready for action. Now, supposing that through the pipe K a jet of water, steam or any other fluid, from any considerable height is admitted into the channel or groove C, it would immediately force against the slider projected in the channel as at N, and also against the fixed partition H; which partition, preventing its passage that way to the evacuation pipe M, where the spent water is discharged, the next slider in succession has passed or covered the junction of the ascending pipe K, so that each successive slider receives the pressure before it is done acting on the former; by this means an uniform rotation is maintained in the cylinder B B, and its velocity will be equal to the descent of the water in the pipe K, and its force equal to the specific gravity of the same. Thus this machine may be worked by steam, condensed air, or wind, or any other elastic or gravitating fluid, for the purpose of working mills, or any other kind of machine or engine whatsoever, they being properly connected with the axis or spindle E E; and when any power is externally applied to the said axis, which may turn the machine in any direction, it becomes a complete pump; possessing all the properties of every other sort of hydraulic engine whatsoever, by applying the pipes K and M accordingly; and it has also much advantage over every other kind of pump, as the fluid pumped is kept in constant motion both in the suction and ascending pipes. This machine may be fixed either in a horizontal or vertical direction.

#### Fire Cements.

1. For furnaces, crucibles, &c.—Fire-clay and brickdust or, fire-clay and burned clay, (broken crucibles) kneaded well together with water, and spread in layers on joints, and thoroughly air dried resists heat without cracking. It may also be employed for coating glass retorts by spreading it as a stiff paste or thinning it with water and spreading with a brush. A little hair added to it, gives greater tenacity. 2. Clay and brickdust mixed with water and 1-10 part borax, gives a difficultly fusible cement; clay and red lead may be used. To make it less fusible, common clay and sand may be employed. 3. For iron vessels, &c. mix 50—8 parts fine and powdered cast iron turnings with 2 parts powdered sal-ammoniac and 1 part flowers of sulphur into a paste with water and apply it immediately; it forms a chemical union, and hardens rapidly. According to some, the sulphur may be omitted. 4. Four parts iron filings or turnings and 3 parts of a mixture of common and burned clay are made into a paste with saltwater.

#### To Stew Pumpkins.

Cut a fine ripe pumpkin in half, and remove all the seeds and other contents of the centre. Slice it, and pare the slices. Put them into a pot with a very little water, and stew them slowly till soft enough all through to mash easily. Then put the stewed pumpkin into a sieve or cullender, and mash it smoothly with the back of a flat ladle, leaving all the moisture drain out, and leaving the pumpkin dry as possible. Put it away to cool and it will be ready for mush, bread pudding, or any similar purpose. To be eaten with meat as a vegetable, season it with pepper, adding some fresh butter mashed among it and send it to the table warm.

#### Mock Cream.

Beat three eggs well; then add to them three heaping teaspoonfuls of fine flour; beat them well together; then stir them into a pint and a half of boiling milk; add to it a salt-spoonfull of salt and loaf sugar to taste; flavor with essence of lemon, stir it while boiling; when it is perfectly smooth it is done.

Line pie tartlet pans with rich puff paste, and bake them in a quick oven; when done, fill them with mock cream; strew powdered sugar over the brown; when a fine color, they are done. These will be found to be altogether superior to custard pies.

#### How to make Leeches Bite.

Dr. Reanes, of Bergerac, advises that the leeches should be put for an instant into weak wine-and-water, the better for being a little warm, just before applying them; no sooner are they laid on the part than even the most sluggish pierce the skin instantly; those even that had been for a short time before used, immediately attach themselves. In the Hotel Dieu, the practice is to wring a linen cloth out of undiluted wine, and wrap the leeches in it for a few moments, which is found to have the desired effect.



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