For the Scientific American.

New Chemical Law.

No. 9.

According to the conditions of this law, all of the compounds of an aggregated series, should also possess similar chemical properties The following examples serve to show the close similarity of the compounds of the aggregated series just given, and also the gradual increase and decrease of properties as the series increase. We will commence by introducing their oxacids.

Nitric Acid, $2R+5O+HO$. specific gravity 1.521, boiling point 187°. liquid.

Chloric Acid, $5R+5O+HO$. oily liquid.

Bromic Acid, $11R+5O+HO$. ropy liquid.

Iodic Acid, $18R+5O+HO$ pasty mass.

The above compounds of the aggregated series unite with precisely 5 atoms of oxygen each according to the conditions of the law. Their specific gravities have not been calculated, neither have their boiling points, simply for the reason that when the attempt is made decomposition takes place. They all possess similar chemical properties, and even some of them, by their small amount, cannot be distinguished apart. The gradual increase of density may also be seen ; thus nitric acid is a limpid fluid ; as the series increase the oily liquid is formed, this as the series further increase assumes the syrupy condition, and finally end in producing a pasty mass, which partakes partly of the nature of a fluid and partly of a solid ; thus showing a gradual increase of density, which must not be overlooked, as it is highly characteristic of the general conditions of the law which we have been explaining, namely, that all properties of an aggregated series or its compounds will as the series increase, either increase or decrease in a regular manner.

The nitrates, chlorates, bromates and iodates of Potash, must also according to the conditions of the law possess similar chemical properties. Upon examination this is found to be correct. In fact the tastes of the nitrate and chlorate of potash are completely similar. No bromate of potash is laid down in any of the works to which I have access, and have therefore no knowledge of its properties. But the nitrates, chlorates and iodates are almost completely similar in their properties When heated they all give off oxygen gas, deflagrate when thrown upon burning coals, and when boiled with the solution of indigo decolorize it. The gradual increase or decrease of properties which they should possess, may be strikingly shown to exist by the fact, that nitrate of potash is tolerably soluble in water. As we increase with the series, however, the solubility of the substances in water gradually decreases until we arrive at the iodate, which we find to be slightly soluble in water. The bromate of potassa should therefore in point of solubility, be intermediate to the chlorate and iodate. The decrease of solubility may be owing to the 11th condition of the law, namely, all those substances situated the highest in the list generally have the least affinity for any particular substance. Consequently the compound of iodine being the highest in the list, should possess the least affinity for the water, which is exactly the case. The following example gives a list of their hydrogen acids.

	Sp. Gr. Vapor.	
Hydrochloric Acid, $Cl+H$.	1.269	gas.
Hydrobromic Acid, $Br+H$.	2 731	gas.
Hydroiodic Acid, $I+H$.	4.385	gas.

Nitrogen does not appear to unite with hydrogen in the exact proportion to form an acid, at least no such acid exists uncombined, as nitrogen when it unites with hydrogen always unites in the proportion of one atom to three forming ammonia. We shall therefore have to look to the three remaining acids for the similarity of chemical and other properties. The similarity is complete, they all emit dense white fumes upon exposure to a moist atmosphere ; their odor is also similar. The compounds do not go high enough in the series to produce either a liquid or a solid, but the density of hydriodic acid is greater than either of the others. By compressing the above gaseous acids, the hydriodic will probably require less pressure to convert it into a solid than either the hydrobromic or the hydrochloric acids. When they are compressed, however, the hydrochloric proves to be a liquid, while the hydrobromic and the hydriodic acids are produced as ice like solids, thus showing the increase of density as the series increase. The union of the above gaseous acids with water produces liquid acids whose specific gravities increase with the series ; thus the specific gravity of the liquid hydrochloric acid is 1.211, whilst that of the hydriodic acid is 1.700. The liquid hydrobromic acid therefore probably possesses a specific gravity between the two. S. N.

Bridgeport, Conn.

Leydoyen's Disinfecting Fluid.

This fluid is the invention of M. Leydoyen, a French chemist. Its efficiency has been tested by a parliamentary commission appointed for the purpose. They tried its effects on substances in a state of decomposition ; on substances about to undergo decomposition ; on night-soil ; on the impure air of hospitals, and of ill-ventilated places. In some of the experiments the fluid was poured over the substances ; in others it was mixed up intimately with them ; in others a cloth or towel, soaked in the liquid, was waved to and fro in the room containing the vitiated air. It was ascertained that the fluid is a solution of a metallic nitrate, and that its action depends on the decomposition of sulphuretted hydrogen, which is the most offensive of all products of animal decomposition. The commissioners reported generally that for removing the miasmata of sick rooms, the offensive odor of drainage, &c., the fluid was likely to be very valuable ; and that so far as sewerage refuse is used as agricultural manure, it is improved rather than deteriorated by admixture with the fluid, in consequence of sulphuretted hydrogen being removed, and nitrate of ammonia formed. The fluid has been clearly shown to be anti-bromic, that is capable of removing smell, but it is not yet known whether it is really disinfecting, that is, capable of removing infection.

Yellow Metal for Sheathing.

This article is coming extensively into use to supply the place of copper for sheathing vessels. It has almost entirely superceded it in England. It is an alloy of copper and zinc, and is used for sheathing and for bolts and nails for vessels, for air pump rods, for steam engines, &c. Its value, compared with copper is about 15 per cent less, copper being 23 cents, and yellow metal 19. Its durability, compared with copper is almost 25 per cent greater. It is more malleable, ductile, and is less easily oxydized by the action of sea water. Many vessels have worn it from three to five years, it still remaining in use, while copper will only last from two to three years, making at least a saving of 33 per cent in favor of this article.

Myriads of Animalcules.

In the Arctic seas, where the water is pure transparent ultramarine color, parts of twenty or thirty square miles, 1,500 feet deep, are green and turbid, from the vast numbers of minute animacules. Captain Scoresby calculated it would require 80,000 persons, working unremittingly from the creation of man to the present day, to count the number of insects contained in two miles of green water. What, then, must be the amount of animal life in the Polar regions, where one fourth of the Greenland sea, for 10 degrees of latitude, consists of that water.

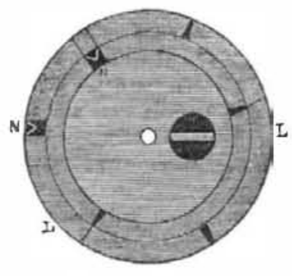
Phosphorescence of the Sea.

Dr. Poeppig, in his voyage to Chili, sailed through about 168 English square miles of this phenomenon ; and if we add that the infusoria causing it may have been equally distributed in the upper stratum of water to the depth of six feet, we must confess that their numbers infinitely surpass the conception of the human understanding.

History of the Rotary Engine.

Prepared expressly for the Scientific American.

Fig. 16.



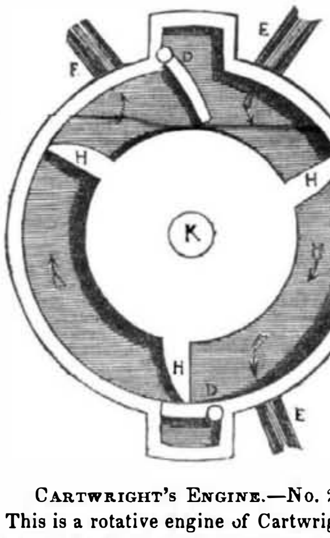
METALIC SPRING PISTON.

To Mr. Cartwright belongs the credit of having invented the first metalic packing which with some modification is now in general use.

Mr. Cartwright's consists of two rings of brass of the full size of the cylinder, which are cut into segments, as shewn at L L L, and laid one over the other, so as to break joint. The joints, therefore, in the under ring are shewn by the dotted lines in the figure, and being thus disposed the two rings are secured in their places by a top and bottom plate, to which the piston rod is fixed. The segments are pushed against the cylinder by steel springs as shewn at N.

In a late work on the high pressure engine by a German Engineer named Ernest Alban, we perceive the metalic packing denounced and the old gasket vindicated and recommended. The objection urged against the metalic packing, is the difficulty of a *true fit* This objection will no doubt make some of our engineers smile, who find no such difficulty, and they will be apt to consider that inferior workmanship—not a correct principle has been the ground of Mr. Alban's attack upon metalic packing.

Fig. 17.



CARTWRIGHT'S ENGINE.—No. 2.

This is a rotative engine of Cartwright and described in his specification of the engine in the last Scientific American.

The axis D, is fixed in an internal drum or cylinder, to the periphery of which are attached the three pistons H H H, which entirely fill the channel formed between the interior and exterior cylinders ; D D, are two valves, or flaps, which when shut into the cavities, form a portion of the exterior cylinder, but when open (as drawn) serve as a butment to receive the action of the steam which, being introduced between a valve and a piston, and stopped from escaping past them, acts upon any of the pistons H, which recede from the pressure, and cause the drum and axis D to revolve. The flaps D relieve each other, so that one of the pistons is passing one at the time the other is open, and receiving the force of the steam. Mr. Cartwright does not describe how these pistons and valves are made, and being made, how they are to be kept tight. Two methods only are known, namely, hempen or metallic packing : the first would be soon destroyed by the holes in the sides of the exterior cylinders, formed for a communication with the boiler and condenser, by means of the pipes E E F, and metallic packing would here require too much nicety and expense to be generally useful.—But this is not all. The friction of the interior drum would far exceed that of the common engine, which it was intended to supersede, and the flaps D D, would be extremely liable to knock themselves to pieces by the frequent striking against the drum, as they are thrown forward by the external machinery.

Golden Yellow.

M Guimet gives the following receipt for making a yellow color, of a golden tint, much more intense than the well known Naples yellow. Take of antinomiate of potass (carefully washed) one part, and of minium two parts, grind and mix them well into a paste ; then dry the paste and reduce it to a powder ; and lastly, expose the powder for four or five hours to a red heat, taking care not to raise the temperature so high as to disengage the oxygen from the lead and antimony.

Air Guns.

It is a curious fact, that although the air-pump is a modern invention, yet the air gun, which is so nearly allied to it in the construction of its valve and condensing syringe, should have existed long antecedent to it ; for it is recorded that an air gun was made for Henry IV. by Marin of Liseau, in Normandy, as early as 1408, and another was preserved in the armory at Scmetau, bearing the date of 1474. The air gun of the present day is, however, very different from that which was formerly made, and which discharged but one bullet after a long and tedious process of condensation, while it now discharges five or six without any visible variation of force, and will act upon a dozen, though with less effect.

Changes in Solid Forms.

The gradual change of form of a body which still continues solid, is a problem at which many are confounded, because they cannot imitate the great experiments of nature. On a grand scale, it does not hold ; but, in a smaller way, the barley sugar, which, in course of time, becomes crystaline and dull, presents an example of change of structure without any alteration of its solidity ; and copper coins, buried in the earth, become oxidized without losing their impressions.

Mr. John Wilson Ingleheart, of South River Md., has sent to the editor of the Annapolis Republican, a pear that he pulled from a tree on his farm that had blossomed the second time this season and bore three pears.