For the Scientific American.

New Chemical Law.

No. 13.

Proceeding in the classification by the similarity of the chemical properties of substances, we may probably arrive at the following aggregated series derived from the aggregation of a radical whose atomic weight is 6.85.

		Sp. Gr.	
Aluminum	6.85X 2=13.70		solid.
Chromium	6.85X 4=27.40	5.90	solid.
Molybdenum	6.85X 7=47.95	8.60	solid.
Vanadium	6.85X10=68 50		solid.
Tungsten	6.85X14=95.90	17 50	solid.

The principal properties which characterize these substances, are their extreme bitterness and infusibility. Even Aluminum the lowest substance in the series requires for its fusion a temperature greater than that at which cast iron is liquified. The fusing points of the other substances are much higher, which is in accordance with the requirements of the law. The following shows the close agreement of which is found to exist between the the calculated and experimental and atomic weights.

	By Calculation.	By Experiment. Kane.	Turner.
Aluminum	6.85X 2=13.70	13.70	13.70
Chromium	6.85X 4=27.40	28.19	28.00
Molybdenum	6.84X 7=47.95	47 96	47 70
Vanadium	6.85X10=68.50	68.66	68.50
Tungsten	6.85X14=95.90	94 80	99.70

The following example gives a list of the acids, with their compositions, showing that in this case the aggregated substances in uniting with oxygen to form an acid, unite with an equal number of atoms of oxygen according to the requirements of the law. The specific gravities, &c. are not recorded.

~~Chromic Acid 4R+O3. solid.~~
Molybdic Acid 7R+O3. solid.
Vanadic Acid 10R+O3. solid.
Tungstic Acid 14R+O3. solid.

This series of acids is remarkable for the variety of colors which their combinations produce. Perhaps it may be thought by some that since the combinations of aluminum are generally colorless, that it does not belong to the family. But this does not follow: for the compounds of alumina, although they do not like the other compounds, absorb the rays of light, yet it absorbs the rays of heat in a remarkable degree. We may consequently conclude that this is no reason why it should not belong to the same family, as the rays of light are analagous to the rays of heat. The following gives an example of the Chlorides with their composition.

Chloride of Aluminum 2R+Cl.3. solid.
Chloride of Chromium 4R+Cl.3. solid.

The chloride of molybdenum, vanadium and tungsten of the above form of composition, have not yet been discovered, although a number of other chlorides exist. I introduce the above example expressly to show the close similarity existing between the compounds of aluminum and chromium. An examination of their chemical properties will convince any one that the similarity is complete. All analytical chemists well know that the oxides of aluminum and chromium, are so similar to each other in their chemical properties as to render their separation extremely difficult — The following gives an example of their sulphurets.

Sulphuret of Molybdenum 7R+S3. brown solid.
Sulphuret of Vanadium 10R+S3 brown solid.
Sulphuret of Tungsten 14R+S3. brown solid.

No sulphurets of aluminum and chromium of the above form of composition have yet been discovered; but the similarity of the three remaining sulphurets is complete, and it is singular that they are all precipitated as brown powders but change to a deep black upon being dried. No specific gravities but those belonging to the aggregated series have been given, because unknown. The truth of the law therefore, by these substances, remains to be seen in the results of future experiments.

There is another class of aggregated substances which I intended to produce, and as it is short, and no specific gravities and boiling points are known of any of the substances, I present it here.

	By Calculation.	By Experiment. Kane.	Turner.
Lithium	6.25X 1= 6.25	6.44	10.00
Strontium	6.25X 6=43.75	43.80	43.80
Barium	6.25X11=68.75	68.70	68.70

S. N.

Bridgeport, Conn.

Particular Varnishes.

CRYSTAL VARNISH.—1. Genuine pale Canada balsam and rectified oil of turpentine. equal parts; mix, place the bottle in warm water, agitate well, set it aside, in a moderately warm place, and in a week pour off the clear. Used for maps, prints drawings, and other articles of paper, and also to prepare tracing paper, and to transfer engravings.

2. Mastic 3 oz.; alcohol 1 pint; dissolved. Used to fix pencil drawings.

ETCHING VARNISH.—1. White wax 2 oz.; black and Burgundy pitch, of each ½ oz.; melt together, add by degrees powdered aspaltum 2 oz., and boil till a drop taken out on a plate will break when cold by being bent double 2 or 3 times between the fingers; it must then be poured into warm water and made into small balls for use.

2. Linseed oil and mastic, of each 4 oz.; melt together.

3. Soft Linseed oil 4 oz.; gum benzoin and white wax, of each ½ oz.; boil to two-thirds.

FLEXIBLE VARNISH.—1. India rubber in shavings 1 oz; mineral naptha 2 lbs.; digest at a gentle heat in a close vessel till dissolved, and strain. 2. India rubber 1 oz.; drying oil 1 quart; dissolve by as little heat as possible, employing constant stirring, then strain. 3. Linseed oil 1 gallon; dried white copperas and sugar of lead, each 3 oz.; litharge 8 oz.; boil with constant agitation till it strings well, then cool slowly and decant the clear. If too thick, thin it with quick-drying linseed oil.

~~Three are used for balloons, gun bags, &c.~~

Presence of Copper in the Bodies of Animals.

M. Deschampse of Paris, states that this metal is constantly present in most of the formations in the vicinity of Paris, and seems to be derived from the decomposition of cupriferous sulphuret of iron. It is taken from the soil by plants—and from them by men and animals Copper and also lead are received in part from cooking utensils, &c. Soils free from copper soon obtain a portion by manures. Carbonate of ammonia is the means of carrying copper from the soil into plants, and in the azotised compounds of this metal seems to enter, by a replacement similar to that which takes place in certain ammonical salts. These are a few of the conclusions M. Deschamps draws from his curious investigations.

Cure for Dropsy.

Mr. Lynn of the Irving Institute in a letter to the Christian Advocate and Journal states that his wife was completely cured of severe dropsy by the use of the vapor bath medicated with Apocynum.

Liquids expand by heat in an increasing ratio; a greater dilation occurring at high, than at low temperatures. Thus, if a fluid is heated from 32° to 122°, it will not expand so much as it would do in being heated form 122° to 212°; though an equal number of degrees is added in both cases. In mercury the first expansion according to Deluc, is to the second as 14 to 15; in olive oil as 13.4 to 15; in alcohol as 10.9 to 15; and in pure water as 4 7 to 15.

A magnetic property is given to brass by hammering, supposed to be occasioned by the minute particles of iron separated from the hammer and the anvil during the process, and forced into its surface. This circumstance makes it necessary to employ unhammered brass for compass boxes and similar apparatus.

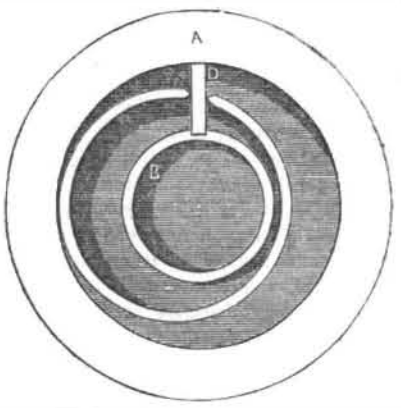
Some suppose our atmosphere to be only 18 miles high, others 50. Whatever it may be, one thing is true, that it is an ocean vast and deep.

History of the Rotary Engine.

Prepared expressly for the Scientific American.

TROTTER'S ROTARY ENGINE.

FIG. 24.



In 1805 Mr. J. Trotter of London, obtained a patent for the following kind of rotative engine which in itself although of little value is eccentric enough to excite curiosity.

A, a circular piece called the outer barrel. B the inner barrel. C, a circular piece called the eccentric. D, a piece called the sweep, which shuts completely across the space between the inner and outer barrels, so as to intercept the communication in that part. There are caps or covers at each end of the pieces, which close the space between the two barrels, and serve, by grooves or other well known fittings, to keep the other parts in their respective places.

The situations and motions of the parts herein enumerated are as follow:—1st, the barrels are concentric; 2ndly, the sweep is capable of moving or revolving (either by absolute or rotative motion) through the space between the barrels: it may be either separate from the barrels, or it may be fixed to either or both of them, and in the last mentioned cases, the barrel or barrels to which the sweep shall or may be so fixed, will necessarily move along with it. The sweep is so well fitted or fixed that no fluid shall pass through the places of its opposition or junction with the barrels or caps, or as that the quantity suffered to pass shall be inconsiderable. 3rdly, the eccentric is of such a diameter and so wrought, that its concave and convex surfaces shall touch the inner and outer barrels, and that the places of contact shall not admit any fluid to pass between the eccentric and each barrel severally, or at least, that the quantity which may so pass shall be inconsiderable.

The eccentric is capable of rotation in its own plane or periphery, but not otherwise with relation to the caps; and it has a long perforation through which the sweep is put, consequently the sweep and the eccentric will always move together.

Whenever the sweep is moved, the space which is between the barrels and the eccentric, and the posterior surface of the sweep, will be continually enlarged, and that the space which is in like manner comprehended between the barrels and the eccentric, and the anterior surface of the sweep, will be continually diminished, excepting that, soon after the sweep has passed at or near the places of contact between the eccentric and the outer barrels, the posterior space will be suddenly diminished by the separation of all that portion which was comprehended between the eccentric or outer barrel, in consequence of the place of contact having come to be behind the sweep. And also, that after the sweep has passed at or near the place of contact between the eccentric and the inner barrel, the posterior space will be suddenly diminished by the separation of all that portion thereof which was comprehended between the eccentric and the inner barrel, in consequence of the place of contact having come to be behind the sweep; and the said portions so separated will then respectively become portions of the anterior spaces, in consequence of the interval or distance which will at the same time be formed between the eccentric and the barrel immediately before the sweep. Whence it is manifest, that if any fluid be forced through one or more apertures from without into the space on one side of the sweep, that pressure will carry the sweep forward and the eccentric along with it, together with such barrels, as by the constructions shall or may be fixed to the sweep; and, moreover, if there be any one or more other apertures communicating from the opposite side of the sweep in order to allow the said fluid to escape, or be carried off or condensed, or otherwise disposed of, all such portions of the said fluid as, by the change of situation of the sweep before described, shall be separated from the occupying part of the space behind the sweep, and shall come to occupy part of the space before the same, will, in fact, so escape or be carried off, or condensed, or disposed of, and the rotative motion of the engine will be kept up, and may be applied as a first mover to other works, so long as a due supply to the said fluid shall be afforded.

It is manifest, that in case the rotatory motion of the said engine be produced by any force not applied to its internal parts in the manner hereinbefore described, and any fluid be admitted to communicate with the posterior space within the same, the said fluid so admitted will flow into or be absorbed in the same space, which becomes continually enlarged, and will afterwards be transferred to, and drawn out of, the anterior space which becomes continually diminished as aforsaid: and that, in this application, the said engine may be used to rise or give motion to fluids in any direction whatever.

The above is the language of the specification and presents but the fairest side of the question. There is enough of friction about it to nullify all the proposed good effects of its ingenious construction.

Great Telegraph Feat.

The entire President's Message was telegraphed from Baltimore to St. Louis, the task being completed on Wednesday afternoon, in just twenty-four hours from the commencement. The message was written out in full, following the copy verbatim, even to the punctuation and paragraphs, a thing not usually done in telegraphing. The number of words was 50,000. The idea of such a document appearing in print in a city nearly one thousand miles distant from Washington, twenty-four hours after delivery is almost beyond belief. Well has the poet on our first page sung of its power.