For the Scientific American.

New Chemical Law.

No. 10.

We will continue the subject by introducing a few more examples.

	Boil. Point.	
Terchloride of Silicon,	124°	liquid.
Terbromide of Silicon,	302°	liquid.
Teriodide of Silicon.		

No compound of nitrogen with silicon nor iodine with silicon, has yet been discovered. The iodide of silicon should possess a similarity of chemical properties, also a boiling point greater than that of the bromide of silicon. The boiling points in the above example are on the increase. No specific gravities are given. The terbromide of silicon freezes at the temperature of 10° ; if then the law be true, the teriodide of silicon should be a solid at that temperature, and at common temperatures. Future experiments will therefore determine the truth or falsity of these remarks. The following is an example of the substances composing this aggregated series uniting with one of the substances produced by the aggregation of the radical C H previously described.

Chloride of Methyle, Cl.H+2 CH. gas.
Bromide of Methyle, Br.H+2 CH.
Iodide of Nethyle, I.H+2 CH. specific gravity 2.237, boiling point 112°. fluid.

Here we have a case where the two series come in contact, and yet all the conditions which the law requires, are fulfilled as far as the properties are given. The bromide of methyle is probably a liquid, but if a gas, it is easily compressed into the liquid state, and should be exceedingly volatile. Its specific gravity should also be less than the iodide.—This intersection of series may be still further seen by the following examples of the same series as the last but higher in the list.

Chloride of Ethyle, Cl.H+4 C H. specific gravity .874, boiling point 52°. fluid.

Bromide of Ethyle, Br.H+4 CH. sp. grav. 1.450 fluid.

Iodide of Ethyle, I.H+4 CH. sp. grav. 1.920. boil. pt. 161°. fluid.

The specific gravities in this example are all given and how faithfully do they agree with the conditions required by the law. The boiling points of the bromide of ethyle is not given, but if it is governed by its weight of atom, it should possess a boiling point of about 102°, perhaps some higher. Future experiments upon this substance will give us its exact boiling point, and then we shall see if this be the case. The boiling points, specific gravities, &c. of the chloride, bromide and iodide of amyle, should also increase in a regular manner and possess similar chemical properties.

Perchloride of Formyle, Cl.H+2 C.Cl. specific gravity 1.480, boiling point 141° liquid

Perbromide of Formyle, Br.H+2 C.Br. spe-grav. 2.100.

Periodide of Formyle, S.H+2 C.S. boiling point 280° vol. solid.

The perchloride of formyle or chloroform, as it is commonly termed, is by this law considered as chloride of methyle, with its two atoms of hydrogen belonging to the aggregated series of C H. replaced by chlorine, bromoform and iodoform are merely the bromide and iodide of methyle with their two atoms of hydrogen in the base, replaced by either bromine or iodine : the same as the hydrogen in the chloride of methyle, is replaced by the chlorine This gives an example where an aggregated series is by substitution changed into another. In the above example the boiling point of the periodide of formyle is greater than that of the perchloride. The boiling point of the perbromide should therefore be between the two. The perchloride is a fluid whilst the periodide is a solid, which is according to the requirements of the law. The specific gravities of the perbromide and the periodide are probably greater than that of the perchloride, and that of the periodide greater than that of the perbromide, that is, there should be a regular increase of specific gravities.

Chloride of Phosphorus, Cl.3+P. liquid.
Bromide of Phosphorus, Br.3+P. liquid.
Iodide of Phosphorus, I.3+P. solid.

The specific gravities and boiling points of these substances have not yet been ascertained ; they probably increase with the series. It may also be seen that the general density increases according to the requirements of the law ; the first two being fluids and the last a solid.

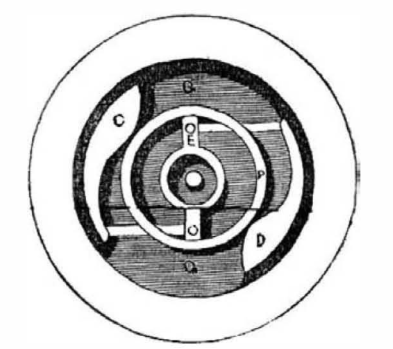
When it is asserted that a regular increase or decrease exists in the specific gravities, &c. of the chlorides, bromides and iodides of any particular substance whatever, the assertion admits of proof. Who then is there who will show a single instance of the failure of the requirements of the law. In the examination of the substances, we have proceeded upon the ground of similarity of chemical properties to the substances themselves, and have shown their probable composition or constitution, the same as if we had proceeded from the similarity of the chemical properties of the substances comprising the aggregated series of C.H. to their composition. Both cases are precisely similar. Why then are not the elements above treated of compound, and aggregated from a radical whose atomic weight is 7. S. N.

Bridgeport, Conn.

History of the Rotary Engine.

Prepared expressly for the Scientific American.

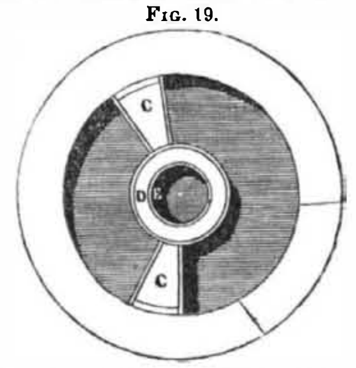
Fig. 18.



HORNBLOWER'S ROTARY ENGINE.

Mr. Jonathan Hornblower's Rotative Engine (for which a patent was secured in 1798) displays much ingenuity. The vessel in which the steam operates consists of a hollow cylinder, composed of two unequal parts, the smaller section of which is screwed off and on, for the purpose of rectifying and repairing the internal structure. These parts are cast separate, and then screwed together, firm and close, by means of flanches. They are then covered with lids turned also true, and form a figure resembling a drum. A Z are two tubes, which pass through the central openings in the lid of the drum, meeting each other at B. I H N M, are the interior limits of those tubes, on the inside of the drum, which are considerably larger than at A Z, in their diameters ; the use of which is, that thereshall be a proper cavity at U T, R O, to receive a packing of tow and grease, or any other materials answering the purpose, between that particular part and the end of the drum ; and also the frames of the diaphragms C C, may have the firmer holding to the hollow axles or tubes at D D, leaving the parts of the diaphragm pendent at S K. The dotted lines show the interior limits of the drum, when the diaphragms are in their places; between which and the extremities of the diaphragms there is a proper rabbet to receive the packing, and between the pendent part of the diaphragms and the central hollow tube about which it revolves. This rabbet is formed by means of plates of metal, screwed on to the frame of the diaphragms, having their edges nearly in contact with the inner surface of the drum, and will be found accessible to repair or renew the packing, when the pannel which constitutes a part of the drum is removed. The parts E G, may also be repaired at the same time, by removing two screws at each end of the hollow tube. The diaphragms (which are standing in opposite directions) may therefore freely revolve the one after the other, or one may move whilst the other remains stationary. The tubes to

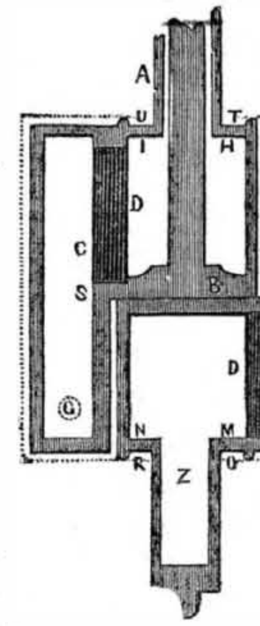
Fig. 19.



which they are attached will have their concentricity preserved by means of the solid axle within the hollow one at E, which is fixed to the end of the tube Z, and passes closely through a hole in the end of the tube A, till it reaches the extremity ; where, by means of a second collar, its central position is critically maintained. The two diaphragms are hollow within, and hold communication with the cavities of their respective tubes which compose the hollow axes ; and these communications are made by oblong openings where the diaphragms and tube are connected at D D.

The diaphragms are completed when these plates are screwed on ; in these plates are fixed two valves G, opposite to which are two others, one in each diaphragm, so corresponding, that at the opening of one the other is closed, and vice versa. These valves are balanced and held in trunions, so that, in every station of the diaphragms, they may uniformly obey the impulse by which they are opened and shut; the manner in which that is effected is as follows :—The two diaphragms widen towards their extremities in the manner of radii, (see Fig. 2) and may therefore be brought into sufficient contact to force open the valves by means of prominences on them for the purpose.

Fig. 20.



To explain the manner in which the diaphragms are wrought upon when in their proper place, let Fig. 2 represent one end of the hollow cylinder or drum, and the central circles exhibit the hollow tubes or axles already explained The two diverging parts are the ends of the diaphragms, and are packed as before mentioned ; now, these diaphragms are hollow within, and if we consider one of them to be constantly supplied with steam by means of the hollow tube to which it is connected, and the other continually holding communication with the condensing water, the consequence will be, when steam is admitted through a valve into the lesser apartment of the drum, and another valve open from the empty diaphragms into the larger apartment, that the diaphragms will recede from each other, with all the force of the steam between them ; but if, by proper prevention, they can move only in one direction, it is plain that the one will remain stationary till overtaken by the other; their junction will then shift the valves into contrary positions by means of the prominent parts in them for that purpose, and the apartment, before filled with steam, instantly becoming empty, the diaphragm which was before stationary now becomes active, and the momentum of the former may, in effect, be considered as transferred to the latter. There being, therefore, in these parts of the machine a continual motion, by rapidly succeeding each other in a circular direction, their respective axles on which they turn, and which communicate motion to other machinery without the drum, are influenced in the same manner, agreeable to the main principles herein primarily set forth.

In order that the steam shall have a power of turning the diaphragms only in one direction, let Fig. 1 represent one of the lids of the drum, having the side that is faced true on the opposite direction to that exhibited in the drawing ; in this is a circular channel, G G, and a projecting ring P, which serves as a perpetual fulcrum to support the two levers, C D, that occasionally revolve in the channel, and act as detents. The outer boundary of the channel also acts as a fulcrum to the extremity of the two levers at their thick ends ; so that, when they are acted upon, from their connection with the axles turning them to the right hand, by means of a strong collar E, there will be no impediment to their freely revolving in the circular channel ; but, when the axlesstrain upon the small ends of the levers in the contrary direction, they instantly become fixed so firmly between the two boundaries of the channel, as effectually to resist the whole force of the machine. To provide against the least retrograde motion whatever, when the levers may be partly worn from friction, they are furnished with springs between them and the outer extremity of the channel, so that the two bearing points may at least touch their respective fulcrums.

Artificial Legs of India Rubber.

A patent has lately been taken ont in England for a vulcanized India rubber Leg. It is described by foreign papers to be the best artificial leg ever made in England—throwing the famous Anglesea leg quite in the shade.

A rich vein of red oxide, or pipe iron ore, has been discovered in Mills county, Mo. ; in the midst of a heavily wooded country, and distant four miles from the Osage River. Copper has been found in the same place, and there is, it is believed, a supply of stone coal within five miles of the vein of iron.