For the Scientific American.

New Chemical Law.

No. 14.

It has been remarked that oxygen gas in uniting with other substances, bears a strong resemblance to chlorine, bromine and iodine, and like them, possesses strong electro-negative qualities, but it cannot belong to the same aggregated series with these substances, since the chemical properties of its compounds are different. Thus oxygen in uniting with hydrogen, should form a gaseous hydracid similar to the hydrochloric, hydrobromic &c. acids, did it belong to the same aggregated series: but we find instead of producing a gaseous hydracid, water is the result, which being a liquid is contrary to the requirements of the law, and therefore removes all possibility of its belonging to the above mentioned class.—But if it cannot be considered as belonging to the above mentioned class; its manner of union seems to indicate that it may be a compound of that series. By comparing the chemical properties of oxygen with the chemical properties of the compound of chlorine, bromine and iodine, we may discover a compound of known composition, from which by analogy we may be enabled to arrive at the true composition of oxygen. To what compounds then of chlorine, bromine and iodine is it similar?

It is well known that oxygen gas was formerly considered the only acidifying principle in existence, and that the presence of oxygen was necessary for the formation of any acid whatever. This is now known to be an error, since perfect acids can be formed without the least particle of oxygen entering into their composition. The hydrogen acids of chlorine, bromine and iodine are examples of the existence of acids containing not the least particle of oxygen. May we not consider this acidifying power as derived from one source and thus claim hydrogen the only acidifying principle in existence, oxygen an hydracid, and similar in the form of its composition to any of the hydracids. This view gives a satisfactory explanation of the form of its composition, and although oxygen possesses not the least taste of an acid, yet this may be ascribed to the fact that in the series it is so far situated from any other of the hydracids, as to differ in its tasting properties. Thus nitrogen is tasteless but the same cannot be said of the remaining substances in that class, viz. chlorine, bromine and iodine. If oxygen be an hydracid with an atomic weight of 8, the radical which has united with hydrogen to form it, must evidently possess an atomic weight of 7. Now according to the properties of this series this radical must be one of its substances, and since it possesses an atomic weight of 7, it must be the radical which by its aggregation forms nitrogen, chlorine, bromine and iodine. It must possess an intense affinity for hydrogen and it is probably for this reason that oxygen has never been decomposed. This is the only satisfactory way of accounting for its composition by this law, and is a result flowing from its direct application. As it must be a chemical compound, some future attempt at its decomposition may prove effectual. It is at least worthy of the trial, for there is probably no substance which plays a more important part in the operations of nature than oxygen; a true knowledge of its composition is therefore much to be desired. There is another substance included in the present list of the elements which must be also considered as a chemical compound and the products of a chemical union, namely, fluorine. This substance in its chemical properties closely resembles chlorine, bromine and iodine, but an examination of its compounds removes the idea of similarity. To what substance then is it similar?

If we examine the similar cyanides, or these cyanides which have the same form of composition as the fluorides, we can perceive a close similarity in their chemical properties. If upon this ground we consider fluorine possessing a form of composition similar to cyanogen, we will have the following compound hydracids.

Hydrofluoric Acid C2R+H. specific gravity 1.0609, boiling point 58°. liquid.

Hydrocyanic Acid C2 2R+H. specific gravity .6969, boiling point 80°. liquid.

Where R. represents the radical of the nitrogen, chlorine, bromine and iodine family, and 2R represents nitrogen, fluorine should therefore possess an atomic weight of 12.+7, that is 19. These statements are supported by theoretical evidence and may therefore be false, too much dependence must not therefore be placed in them, although there exists greater reason for the belief in the compound nature of oxygen, than in the compound nature of fluorine.

S. N.

Bridgeport, Conn.

To Measure the force of Pressure.

If we take a leaden bullet of any determinate diameter, and expose it to pressure between plates of harder metal made to approach each other in a parallel position, the bullet will be compressed or flattened on the opposite sides in an equal degree; provided the lead is pure, the degree of compression will indicate the amount of pressure. With a graduated press of the lever kind, it will be easy to form a scale of pressure corresponding to the different degrees of compression until the ball is reduced to a flat circular plate of about one-fifth of an inch in thickness, and it will be found that an ordinary bullet of about five-eighths of an inch diameter will require a pressure of near 4000 pounds, to effect this degree of flattening. Suppose, therefore, we wish to measure an actual pressure estimated to be nearly 20 tons, we have only occasion to place ten or twelve of these balls at a proper distance asunder, so as not to be in contact when expanded, and afterwards add into one sum the particular pressure due to each ball from the scale first made, by using the lever press before mentioned. By this mode Mr. Bevan ascertained the amount of friction of an iron screw press with rectangular threads, to be from three-fourths to four-fifths of the power applied; or the actual pressure has not exceeded four of five tons when the calculated pressure, if there had been no friction, would have been 20 tons. The larger the ball, the greater will be the pressure necessary to reduce it to a given thickness. An ordinary leaden shot, of one-eight of an inch diameter will require nearly 100 pounds to compress it to a flat plate. By using a ball of five-eights of an inch diameter, Mr. B. found the actual pressure of the common bench vice to be above ten tons when under the same force; if there had been no friction, the pressure would have been eight tons. In the practical application of these balls, it will be convenient to make a small impression upon them with a hammer, before they are placed between the plates, to prevent them from rolling out of their proper position; this operation will not be found to interfere with the result, as it is the ultimate compression only that is sought and which is not affected by that of a smaller degree before impressed. This property will also be found very convenient, for the same substance may be used several times, by taking care that each succeeding pressure exceeds that of the proceeding. The application of these leaden balls to determine the actual pressure, will not interfere with the regular operation of the press at the same time the balls are used, which of course must be placed between separate plates.

Treatment of the Cholera in Russia.

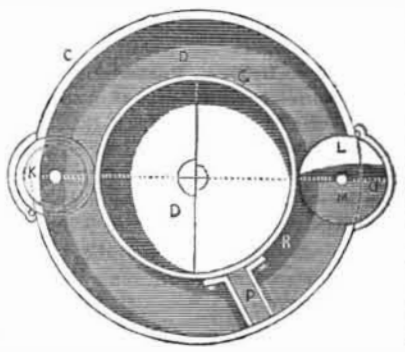
A gentleman in Russia writes that he has upwards of 300 people at work and the cholera all around him; 60 of his people were taken ill and he called them together and explained the symptoms, which are a loss of appetite, a heaviness, and a disagreeable sensation at the pit of stomach. He then administered to those who were seized one glass and a half of spirit of wine in a glass of water, with four or five teaspoonsful of powdered charcoal, and three drops of oil of mint, and the patient took violent exercise until a strong perspiration was induced, and all recovered; those who were weakly he admistered the charcoal to in a fresh egg beat up with a little water, milk warm.

History of the Rotary Engine.

Prepared expressly for the Scientific American.

FLINT'S ROTARY ENGINE.

Fig. 25.



This is an engine patented in England in 1805, by Mr. Andrew Flint. C, fig. 25, is an outer cylinder of cast iron. D, is the bottom plate of the same. G, is the inner cylinder, hollow and divided by a partition. The two cylinders C G, must be turned very true and placed exactly concentrically. A hollow central shaft is cast in one piece with G, forming an axis. K and L, are two valves consisting of a top and bottom plate, M M, as seen in

Fig. 26.

connected by a portion of solid cylinder N.—The plates M, are sunk into the plates D, so as to be flush with their inner surfaces, and the connecting piece N, lies in and fills the cavity prepared for its reception in the outer cylinder C, at O, and thus completes the inner surface of the same. P, is a steam float firmly attached to the cylinder G, and revolving with it through the circular passage left between the two cylinders, which passing it accurately closes by means of a packing of hemp and tallow. The several parts must be well packed to prevent leakage, and this has been and always will be the great difficulty attending rotary engines. This is owing to their form. There is a circular groove R, sunk in the inner surface of the plates D, concentrical to the axis of the cylinder G, and the valves K and L respectively. In this groove is placed a metal packing ring fitted with packing against which the surfaces of the said plates G K, and L work. This packing is regulated to any degree of tightness by screws passing through the cover of the cylinder. The steam is admitted to the lower division of G, and passing through the aperture before L, it acts upon P with a power proportioned to its elasticity and the area of P, and thus forces it round till it passes the valve K when it passes through the small aperture seen there, and from there it is passed to the upper division of G, and by a winding passage it is, according to the specification, made to pass into the hollow axis, to get the reaction force of the steam. It is but a very poor engine indeed. The reaction force of the steam is a very great blunder in some mechanical contrivances. Whatever "reactive force" of steam as they call it, is endeavored to be employed, it is so much *reaction* loss, that is all. Steam is not water—this should not be forgotten. It is a combination of a certain amount of caloric with water which gives the water new powers and new principles. Mr. Flint's rotary never made his fortune, and it now operates only on print, a beacon to warn the youthful mechanical navigator from getting wrecked on a sand bank.

Spear Practice of the Hawaiians.

"They were peculiarly expert," says a recent voyager to Isles of the Pacific, "in the hurling of the spear and miraculously so in avoiding of it when hurled against themselves. To this practice they were systematically trained; and even now, after peace has continued nearly fifty years, and civilization has substituted its own weapons for those of barbarism, the officers of the fort, who were always happy to entertain us with specimens of their native warfare, perfectly astonished us with their dexterity in the management of the spear. One stood to be aimed at, while several others, at a distance of about twenty paces, rapidly darted against him the long spears of ancient times with such vigor and certainty, that their comrade, who acted as their common butt, could be saved by nothing but his own coolness and agility. But he was apparently as much at his ease as if he had been Gulliver among the Lilliputians. Some of the weapons he would send flying off at an angle by touching them with his shoulder, or leg, or arm. Others he would catch by the middle and hurl back at the throwers, thus directly turning the tables on the enemy. One or two he might perhaps clutch between his arm and side, and, at all events, even when a special display of skill was impracticable, he would still dodge the mischief by a slight inclination on his body. In this apparently dangerous pastime Kamehameha was rather fond of exposing his royal person; and when urged to be more careful of his valuable life he replied, that it was as easy for him to avoid the spears as it was for his antagonists to throw them."

The Ice Trade.

Since January last there have been exported from Boston 55,522 tons of ice, an increase over last year of 8,170 tons. The great success of the Bostonians at the East in supplying more Southern sections with ice has aroused speculation in the same article on the Northwestern lakes. A large temporary building was erected last year on the banks of Lake Huron, and about 3000 tons of a pure article was secured. During the past summer this ice was shipped to Cincinnati, and sold in that market from $30 to $60 per ton. A company is now forming in Cincinnati with a capital of $50,000, for the purpose of supplying New Orleans with the article, by the way of the Illinois Canal and River. It is the intention of the company to build flat boats and send them direct through to New Orleans without unloading. The ice of Detroit River and Lake Huron is of a quality not surpassed any where in the country.