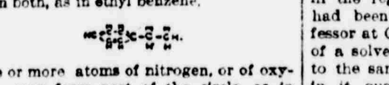
from inspection of the formulæ of the their compounds with hydrogen, thus:



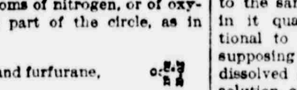
Instances of penta-, hexa-, and even hept a-valency are not wanting.

KEY TO STRUCTURE OF CHEMICAL COMPOUNDS.

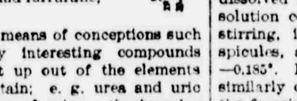
This was the key to unlock the structure of chemical compounds; and Frankland's views, just stated, are still held by chemists. The determination of the constitution of compounds, chiefly those of carbon, occupied the attention of chemists almost exclusively until 1880. The plan of action is much the same as that of a mechanician who wishes to imitate a complicated mechanism. He must first dissect it into groups of mechanical contrivances; these are next constructed, and they are finally built together into the complete machine. In certain cases the atoms of carbon are arranged in "chains," as, for example, in pentyl alcohol,

$$\begin{array}{c} H_3C-C-C-C-C-O-H \\ H_2\ H_2\ H_2\ H_2. \end{array}$$

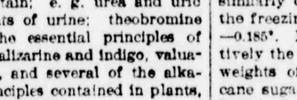
each atom being tetrad, and its "affinities," or powers of combination saturated either with hydrogen or with those of neighboring atoms of carbon; in others they are in the form of a "ring," as in benzene, the formula of which was first suggested by Kekulé, viz.:



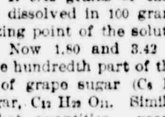
or in both, as in ethyl benzene,



One or more atoms of nitrogen, or of oxygen, may form part of the circle, as in pyridine,



and furfurane,



and so on. By means of conceptions such as these many interesting compounds have been built up out of the elements which they contain; e. g. urea and uric acid, constituents of urine; theobromine and caffeine, the essential principles of cocoa and tea; alizarine and indigo, valuable dye stuffs, and several of the alkaloids, bitter principles contained in plants, of great medicinal value.

THE EFFECT ON INDUSTRIAL PROGRESS.

They have led, too, to the discovery of many brilliant colors, now almost universally employed, to the exclusion of those less brilliant, because less pure, derived from plants, and in one or two cases from animals; the manufacture of guncotton, dynamite and similar high explosives; and to the development of the candle industry, the sugar manufacture, to improvement in tanning, in brewing and in the preparation of gas and oils for illuminating purposes. In short, it may be said that the industrial progress of the latter half of the century has been due to the theoretical views of which a short sketch has just been given.

Such formulæ, however, can evidently not represent the true constitution of matter, inasmuch as the atoms are imagined to lie on a plane, whereas it is evident that they must occupy space of three dimensions and possess the attributes of solidity. The conception which led to the formulation of such views was due first to Pasteur, in his later years director of the institute known by his name at Paris, and more directly to LeBel (Bulletin de la Société Chimique de Paris, 1874) and Van't Hoff (Voorstel tot Uitbreiding der Structuur-Formules in de Ruimte, 1874), now professor at Berlin, independently of each other. In 1848 Pasteur discovered that it was possible to separate the two varieties of tartaric acid from each other, and that that one which rotated the plane of polarized light to the right gave crystals with an extra face, unsymmetrically disposed with regard to the other faces of the crystal. The variety, the solution of which in water was capable of producing left-handed rotation, also possessed a similar face, but so placed that its reflection in a mirror reproduced the right-handed variety. Pasteur also showed that a mixture of these acids gave crystals not characterized by an unsymmetrically placed face; and also that the solution was without action on polarized light. These observations remained unexplained until LeBel and Van't Hoff, in 1874, simultaneously and independently devised a theory which has, up till now, stood the test of research. It is briefly this: Imagine two regular tetrahedra, or three-sided pyramids, standing each on its triangular base. An idea can best be got by a model, easily made by laying on a table three lucifer matches so as to form an equilateral triangle, and erecting a tripod with three other matches, so that each leg of the tripod stands on one corner of the triangle. At the centre of such a tetrahedron an atom of carbon is supposed to be placed. Marsh gas, CH_4, is supposed to have such a structure, each corner, or solid angle of the structure (of which there are four) being occupied by an atom of hydrogen. This represents the solid or *stereochemical* formula of methane or marsh gas. Now, suppose one of the atoms of hydrogen in each of these structures to be replaced by chlorine, the group (OH), or any other monovalent element or group. It is evident that, if not exactly similar (owing to the replacement not having been made at similar corners in each), the two structures can be made similar by turning one of them round until the position of the substituting atom or group (which we will term X) coincides in position with X in the stationary one. If two such replacements be made, say with X and Y in each, coincidence can again be made to take place; but the same is not the case if X, Y and Z replace the three atoms of hydrogen in the structure; for there is one way of replacement which is the optical image of the other, and represents the other's reflection in a mirror,

and

DEVELOPMENT OF BACTERIOLOGY.

Now, it is found that when the four corners of such a structure are occupied by four separate atoms or groups, or when (as the expression goes) the body contains an "asymmetrical carbon atom," if the substance of one of its derivations can be obtained in a crystalline form, the crystals are also asymmetric, i. e., each develops a face which is the mirror reflection of a similar face developed on the other variety; and if a beam of polarized light be passed through the solution of the substance, its plane is rotated to the left if one variety be used, and, if the other, to the right. This hypothesis of LeBel's and Van't Hoff's has had an enormous influence on the progress of organic chemistry. By its means Fischer, now Professor at Berlin, has explained the reason of the existence of the enormous number of bodies analogous to grape and cane sugar and has prepared many new varieties; and it appears likely that the terpenes, a class of bodies allied to turpentine, and comprising most of the substances to which the odor of flowers is due, may thereby find their explanation. It may be mentioned in passing that Pasteur, having found that ordinary mould destroyed one variety of tartaric acid rather than the other in a mixture of the two, and made use of this observation in order to prepare the unattacked variety in a state of purity, was led to study the action of organisms more or less resembling mould; and that this has led to the development of the science of bacteriology, which has had an enormous influence on our views regarding fermentation in general, and guides the work of our physicians, our surgeons (witness Lister's antiseptic treatment), our sanitary engineers in their estimate of the purity of drinking water and of the disposal of sewage, of our manufactures of beer and spirits, of wine growers, and more recently of farmers. All these processes depend upon the action of organisms in producing chemical changes, whether in the tissues of the body, causing or curing disease, or in the production of flavored alcohol from sugar, or in the manufacture of butter and cheese, or in preparing the land for the reception of crops. We also owe to the genius of Van't Hoff the most important advance of recent times in the region of physical chemistry. It had been observed by M. Raoult, professor at Grenoble, that the freezing point of a solvent as a general rule is lowered to the same extent if there be dissolved in it quantities of substances proportional to their molecular weights. Thus supposing 1.80 grams of grape sugar be dissolved in 100 grams of water and the solution cooled below 0° C. with constant stirring, ice separates suddenly in thin spicules, and the temperature rises to —0.185°. If 3.42 grams of cane sugar be similarly dissolved in 100 grams of water the freezing point of the solution is again —0.185°. Now 1.80 and 3.42 are respectively the hundredth part of the molecular weights of grape sugar ($C_6H_{12}O_6$) and cane sugar, $C_{12}H_{22}O_{11}$. Similarly, Raoult found that quantities proportional to molecular weights dissolved in a solvent depress the vapor pressure of that solvent equally, or, what comes to the same thing, raise its boiling point by an equal number of degrees. But ordinary salts, such as sodium chloride, potassium nitrate, &c., dissolved in water, give too great a depression of the freezing point and too high a boiling point. Next, it had been observed by botanists, De Vries, Pfeffer and others, who had examined the ascent of sap in plants, that if a vessel of unglazed porcelain, so treated as to cause a film of cupric ferrocyanide (a slimy red compound) to deposit in the pores of its walls, be filled with a weak (about 1 per cent.) solution of sugar or similar substance, and plunged in a vessel of pure water, water entered through the pores. By attaching a manometer to the porous vessel the pressure exerted by the entering water could be measured. Such pressure was termed "osmotic pressure," referring to the "osmosis" or passage through the walls of the vessel. Such prepared walls are permeable freely to water, but not to sugar or similar bodies. Van't Hoff pointed out that the total pressure registered is proportional to the amount of substance in solution, and that it is proportional to the absolute temperature, and he showed, besides, that the pressure exerted by the sugar molecules is the same as that which would be exerted at the same temperature were an equal number of molecules of hydrogen to occupy the same volume as the sugar solution. This may be expressed by stating that when in dilute solution sugar molecules behave *as if* they were present in the gaseous state. Here, again, however, it was noticed that salts tended to give a higher pressure; it was difficult to construct a semi-permeable diaphragm, however, which would resist the passage of salt molecules, while allowing those of water to pass freely. Lastly, Arrhenius of Stockholm had shown that the conductivity of salt solutions for electricity may be explained on the assumption that when a salt, such as KNO_3, is dissolved in water it dissociates into portions similar in number and kind to those it would yield if electrolyzed (and if no secondary reactions were to take place). Such portions (K and NO_3 for example) had been named *ions* by Faraday. The conductivity of such solutions becomes greater, per unit of dissolved salt, the weaker the solution, until finally a limit is reached, after which further dilution no longer increases conductivity. Now Van't Hoff united all these isolated observations and showed their bearing on each other. Stated shortly, the hypothesis is as follows: When a substance is dissolved in a large quantity of a solvent, its molecules are separated from each other to a distance comparable with that which obtains in gases. They are, therefore, capable of independent action; and when placed in a vessel the walls of which are permeable to the solvent, but not to the dissolved substance ("semi-permeable membrane"), the imprisoned molecules of the latter exert pressure on the interior surface of these walls as if they were gaseous. Van't Hoff showed the intimate connection between this phenomenon and the depression of freezing point and vapor pressure already alluded to. He pointed out further that the exceptions to this behavior, noticed in the case of dissolved salts, are due to their "electric dissociation" or "ionization" as it is now termed; and that in a sufficiently dilute solution of potassium nitrate, for example, the osmotic pressure and the correlated depression of freezing point and rise of boiling point are practically equal to what would be produced were the salt to be split into its ions, K and NO_3. These views were vigorously advocated by Ostwald (professor at Leipzig) in his *Zeitschrift für physikalische Chemie*, and he and his pupils have done much to gather together facts in confirmation of this theory and in extending its scope.

It must be understood that the ions K and NO_3 are not, strictly speaking, atoms; they are *charged* atoms; the K retains a + and the NO_3 a — charge. On immersing into the solution the poles of a battery, one charged + and the other —, the + K atoms are attracted to the — pole, and are there discharged; as soon as they lose their charge, they are free to act on the water, when they liberate their equivalent of hydrogen. Similarly, the — NO_3 groups are discharged at the + pole, and abstract hydrogen from the water, liberating an equivalent quantity of oxygen. Thus the phenomenon of electrolysis, so long a mysterious process, finds a simple explanation. The course of ordinary chemical reactions is also readily realized when viewed in the light of this theory. Take, for example, the ordinary equation:

$$Ag\,NO_3.\,Aq + Na\,Cl.\,Ag = Ag\,Cl + Na\,NO_3.\,Aq;$$

i. e., solutions of silver nitrate and sodium chloride give a precipitate of silver chloride, leaving sodium nitrate in solution. By the new views, such an equation must be written

$$\overset{+}{Ag}.\,Aq + \overset{-}{NO_3}.\,Aq + \overset{+}{Na}.\,Aq + \overset{-}{Cl}.\,Aq = Ag\,Cl + \overset{+}{Na}.\,Aq + \overset{-}{NO_3}.\,Aq.$$

The compound, silver chloride, being insoluble in water, is formed by the union of the ions Ag and Cl and their consequent discharge, forming an electrically neutral compound; while the sodium ions, charged positively together with the NO_3 ions, negatively charged, remain in solution.

One more application of the principle may be given. Many observers, Andrews, Favre and Silbermann, but especially Julius Thomsen of Copenhagen and M. Berthelot of Paris, have devoted much labor and time to the measurement of the heat evolved during chemical reactions. Now, while very different amounts of heat are evolved when chlorine, bromine or iodine combine respectively with sodium or potassium, the number of heat units evolved on neutralizing sodium or potassium hydroxide with hydrochloric, hydrobromic, hydriodic or nitric acids is always about 13,500. How can this fact be explained? It finds its explanation as follows: These acids and bases are ionized in solution as shown in the equation:

$$\overset{+}{H}.\,Aq + \overset{-}{Cl}.\,Aq + \overset{+}{Na}.\,Aq + \overset{-}{OH}.\,Aq = H.\,OH + \overset{+}{Na}.\,Aq + \overset{-}{Cl}.\,Aq.$$

Water is the only compound formed; and it is produced by the union of the hydrogen ion originally belonging to the acid and the OH, or hydroxyl ion originally belonging to the base. No further change has occurred; hence the uniform evolution of heat by the interaction of equivalent quantities of these acids and bases.

PERIODIC ARRANGEMENT OF THE ELEMENTS.

It now remains to give a short account of the greatest generalization which has as yet been made in chemistry; it has been termed the *Periodic arrangement of the elements*.

In 1864 Newlands of London and Lothar Meyer, late of Tübingen, found that by arranging the elements in the order of their atomic weights certain regularities were to be observed between each element, and in general the eighth in succession from it, in the order of their numerical value. Such similar elements formed groups or quantities, while the elements separating them belong to a *period*, hence the name "periodic arrangement." Commencing with lithium, a light, lustrous metal found as silicate in certain minerals, we have the following series:

Lithium 7	Beryllium 9.2	Boron 11	Carbon 12
Sodium 23	Magnesium 24.3	Aluminum 27	Silicon 28
Nitrogen 14	Oxygen 16	Fluorine 19	Neon 20
Phosphorus 31	Sulphur 32	Chlorine 35.5	Argon 40

and so on. It is only necessary to point out in detail the resemblances between the elements which stand in the vertical columns, but it may be stated that the resemblance extends also to the formulæ and properties of their compounds. Thus, the chlorides of lithium and sodium are each white, soluble salts of the formulæ LiCl and NaCl; oxides of magnesium and of beryllium are both insoluble, white, earthy powders, MgO and BeO (GeO), and so on. Newlands in his preliminary sketch termed this order the "Law of Octaves," and predicted the existence of certain undiscovered elements which should occupy unfilled positions in the table. Mendeléef, professor at St. Petersburg, in 1869 amplified and extended these relations, and he and Meyer pointed out that the volume occupied by equal numbers of atoms of such elements underwent a periodic variation when the elements are classified as above. The prediction of undiscovered elements was made by Mendeléef in a more assured manner; and in several cases they have been realized. Thus, what Mendeléef called "ekaboron" has since been discovered by Lecoq de Boisbandron and named patriotically "Gallium;" Mendeléef's "eka-silicon" is now known as "germanium," discovered by Winkler, and "eka-aluminum" is now Cleve's "scandium." Moreover, the atomic weights of cæsium, beryllium, molybdenum and mercury have been altered so that they fit the periodic table, and further research has justified the alteration.

The valency of these elements increases from right to left, as will be seen by inspection of the following series:

Li_2O Monad.	$Be\,Cl_2$ $Mg\,O$ Dyad.	$B\,Cl_3$ B_2O_3 Triad.	$C\,Cl_4$ $S\,O_2$ Tetrad.	NH_4Cl $P\,O_5$ Triad and Pentad.
$O\,H_2$ $S\,O_3$ Dyad and Hexad.	$F\,H$ $Cl\,(OH)\,O_3$ Monad and Heptad.			Ne— A— No valency.

The elements of no valency are of recent discovery. In 1894 Lord Rayleigh had determined the density of the nitrogen of the atmosphere, having separated from it the oxygen and carbon dioxide which are mixed with nitrogen in air. He found it to be of somewhat higher density than that obtainable from ammonia and other compounds of nitrogen. In conjunction with Ramsay he investigated atmospheric nitrogen; it was absorbed either by a method devised by Cavendish, or by making it combine with magnesium at a red heat. They found that the unabsorbable residue possessed an unknown spectrum, and that its density was nearly 20. To this new gas they gave the name "argon," or inactive, seeing that all attempts to cause it to enter into combination had failed. In 1895 Ramsay, searching for possible combinations of argon in minerals, experimented with one which had been previously examined by Hillebrand of Baltimore and obtained from it helium, a gas of density 2, possessing a spectrum which had been previously discovered in 1868 in the chromosphere of the sun by Jannsen of Paris, and named helium by Frankland and Lockyer. Subsequent liquefaction of crude argon by means of liquid air, prepared by a process invented simultaneously by Linde and Hampson, gave a residue which was named by its discoverers, Ramsay and Travers, "neon." Liquid argon has yielded two other gases also, "krypon" and "xenon." These elements form a separate group in the Periodic Table, commencing with helium, with atomic weight, 4; neon, 20; argon, 40; krypon, 82, and xenon, 128. They all agree in being mono-atomic; i. e., their molecules consist of single atoms, and they have no tendency to form compounds, i. e., they possess no valency.

CHEMISTRY AND COMMERCIAL SUPREMACY.

In this sketch of the progress of chemistry during the century which has just passed attention has been paid chiefly to the progress of thought. Allusions must, however, be made to the applications of chemistry to industrial purposes. The development of the soda industry, the preparation of carbonate of soda and caustic from common salt—initiated in France by LeBlanc (1742-1806)—has been developed by Tennant in Scotland and Musspeath and Gossage, and by Hargreaves, Weldon and Maetea in England; this process has at present a serious rival in the ammonia soda process, developed by Solway in Belgium and by Brunner and Mond in England. The manufacture of sulphuric acid, so long associated with the alkali process, has made enormous strides during the present century, but is still, in the main, the orginal process of causing sulphur dioxide in presence of water to absorb the oxygen of the air through nitric oxide. But the saving of the oxides of nitrogen through the invention of a sulphuric acid tower by Gay-Lussac, known by his name, and the reutilization of these oxides in the "Glover" tower, invented by John Glover of Newcastle, have greatly lessened the cost of the acid. Concentration of the acid in iron vessels is now common, the cost of platinum or of fragile glass vessels being thereby saved. The desulphurization of iron and the removal of silicon, carbon and phosphorus by Bessemer's process, modified by Thomas and Gilchrist through the introduction of a "basic magnesia lining" for the converters, has made it possible to obtain pure iron and steel from ores previously regarded as of little value.

The use of artificial manures, prepared by mixing refuse animal matters with tetra-hydrogen, calcium phosphate and nitrate of soda or sulphate of ammonia, first introduced by Liebig, has created a revolution in agricultural methods and in the weight of crops obtainable from a given area of soil. The influence of manures on crops has been fully studied by Lawes and Gilbert for more than fifty years in their experimental farms at Rothampstead. The most remarkable advances which have been made, however, are due to cheap electric current. The electrolysis of alumina, dissolved in fused cryolite to obtain aluminum, an operation carried out at Schaffhausen on the Rhine and at the Falls of Foyers in Scotland, the electro deposition of pure copper for electric wires and cables, electro silvering, gilding and nickeling, all these are instances where decomposition of a compound by the electric current has led to important industrial results. At present soda and chlorine are being manufactured by the electrolysis of salt solution contained in rocking trays, one of the electrodes being mercury, by the Castner-Kellner process. This manufacture is being carried on at Niagara, as well as in England. But electricity as a heating agent finds ever-extending application. Henri Moissan (professor at Paris) led the way by utilizing the enormous heat of the arc in his electric furnace, thereby, among other interesting reactions, manufacturing diamonds, small, it is true, though none the less real. The use of electricity as a heating agent has received new applications. Phosphorus is now made by distilling a mixture of phosphates of lime and alumina with coke; a new polishing agent has been found in "carborundum," a compound of carbon and silicon produced by heating in an electrical furnace a mixture of sand and coke, and cyanide of potassium, almost indispensable for the extraction of gold from ores poor in gold, is now manufactured by heating a mixture of carbon and carbonate of barium in an electric furnace in a current of carbon monoxide. These are but some of the instances in which electricity has been adopted as an agent in effecting chemical changes; and it may be confidently predicted that the earlier years of the twentieth century will witness a great development in this direction. It may be pointed out that the later developments of industrial chemistry owe their success entirely to the growth of chemical theory; and it is obvious that that nation which possesses the most competent chemists, theoretical and practical, is destined to succeed in the competition with other nations for commercial supremacy and all its concomitant advantages.

WILLIAM RAMSAY.

NOTORIETY CHEAP IN NEW YORK.

Ways in Which Public Attention Has Been Held for a Time in This City.

"Notoriety is the only really cheap thing in the New York market," said a man who has had his share of it for more than thirty years, "and yet the majority of people who seek it miss it because their methods are conventional. A complete list of really well-known New Yorkers would include a bartender, various prize fighters, many people who become known because of successful endeavors in the field of literature, science or business, a few people who have inherited places in the public view and a comparatively large number of people who either by accident of design succeeded in doing something that made them of general interest. New York will welcome a new human freak quicker than any other city in this country. It will, however, extend just as warm a welcome to a new genius and the one becomes as well known as the other. The late Police Justice Patrick Gavan Duffy, peace to his soul! told me a few years ago that he was the best-known New Yorker of his time. When I doubted his statement he proceeded to prove it.

"There is hardly a vaudeville team in this country,' said the little judge proudly, 'that doesn't somewhere in its act bring in my name. Everybody has heard of Judge Duffy. The stories have been quoted by every paper in Europe. Think of that! Isn't that fame?'

"Judge Duffy obtained his fame partly by accident and partly by design. He had an Irish wit of a rather crude sort, and the police court reporters did the rest. Whenever one of them wanted to write a humorous story he would credit it to Judge Duffy. The latter enjoyed this growing reputation so much that he would rather discharge an old offender than lose a chance to make a joke. It was not long before Duffy's fame had become national.

"Less than fifteen years ago the best-known man in New York was a citizen who contributed to its gayety by the gorgeousness of his attire. Every stranger to New York wanted to see the Battery and then this man, who was recognized as the champion dude of the United States. When he went to Washington or Boston his movements were followed as closely as if he were President of the United States. A writer on a New York newspaper during the dull season began describing this man's clothes, and within a few weeks all New York was talking about him.

"A bartender with skill in juggling glasses and concocting not only drinks but big names for them was another newspaper-made well-known man. His liquid humor was a novelty, and to a less degree he became famous like his predecessor, the champion dude. The first man who alleged that he jumped from the Brooklyn Bridge without injuring himself concocting his name as a trade name and which has supported him ever since. A man might jump from the Bridge now in the most sensational fashion and a week later his name might be forgotten, except by the police.

"Two brothers became conspicuous here a few years ago simply because they wore hats of a peculiar block. They were otherwise well dressed of course or their hats would have attracted no particular attention. There was a shoemaker in this city who had stuck to business steadily and who was known only to his customers and a small circle of friends until a friend of his decided to make him a public character and succeeded in doing so. The humor of it was in the fact that the shoemaker had no title to fame. Fame came to him however and he accepted it so seriously that he gave a formal dinner to his admirers who called themselves his 400. He was for several years one of the well-known men in this city and unlike the others he had never done anything particularly freakish. It pleased his discoverer to make him famous and he did it."

ORIGIN OF FAMOUS SONGS.

CHANCE IDEAS THAT WERE WORTH THOUSANDS OF DOLLARS.

Inspiration for Recent Popular Songs Supplied by Little Incidents in the Street—Large Profits in Some Cases—Methods of Graham, Dresser, Thornton and Others.

"Have you ever stopped to consider how some of our most popular songs came to be written?" said a music publisher. "The subject is most interesting. Very few people know exactly how some of the biggest hits were inspired.

"Song writing to-day is quite an art. There are more publishers and more singers than in former years. You've got to have a hustle on or else you'll soon find out that you are not in the swim. At a rough estimate I think hundreds of songs are turned out every week in New York city alone. You've got to be up to date in your ideas and the song must be exceptionally clever before a publisher will take the trouble even to scan the manuscript.

"Of course you remember poor Charlie Graham? No? He died a few months ago in abject poverty, though he was one of the most prolific of song writers. He wrote night and day, and his compositions were very much sought after by publishers. Graham composed 'If the Waters Could Speak as They Flow,' 'Two Little Girls in Blue,' the 'Picture That Was Turned toward the Wall' and other popular songs. He got his idea for this song, 'If the Waters Could Speak as They Flow,' strangely. He was bathing at the seashore where he was filling an engagement, for Graham was quite a singer himself. While the bathers were splashing in the surf Graham, who was ever on the alert for ideas, abruptly turned to a friend and said:

"'Bob, if these waters could only speak as they flow wouldn't they tell a lot of funny things?'

"'You bet,' was the friend's rejoinder. 'Charlie, that would make a fine title for a song, wouldn't it?'

"When Graham went to his room in his hotel that night he sat down and composed the song which soon became very popular. Graham came to write 'Two Little Girls in Blue' by a mere accident. One afternoon while he was racking his brain for a new theme he went to a window in his home in Brooklyn and gazed into the street below. Across the way from his home was a primary school. It was about 3 o'clock and the children were just leaving school. Graham noticed two little girls. They were very pretty and presumably sisters, for they looked very much alike, and both were dressed in blue. Without any ado Graham quickly left that window, took out his pencil and jotted down in his note book 'Two Little Girls in Blue.' That same night he wrote the words and composed the melody and in the course of an hour it was all ready for the publisher. The following day he went from one publishing house to another and tried to dispose of the manuscript. At almost every place he failed to get encouragement. No one seemed to want the song. At last in despair he he induced one publisher to buy the song for $25. Well, I guess you know the rest. The song was one of the biggest hits in years and is probably sung somewhere to-night. The publisher who bought the composition says he made nearly $60,000 out of it.

"Graham never thought much of the song himself, which goes to prove that writers of this kind of music have little business ability. Graham's other hit, 'The Picture That Was turned To ward to the Wall,' had a checkered career before it found a purchaser. Charlie received his inspiration from a scene in the play 'Blue Jeans.' Do you remember that part where the old man—I think it was Sue's father—turns her picture to the wall? Graham, who in my estimation was a genius, saw a capital idea in that incident and used it for his song. This song practically made the house which published it. Its sale was rated at present among the best music publishing houses in the country. I don't know how much Graham received for the manuscript, but I don't think it was more than $15. He sold most of his stuff outright and did not care to take chances on royalties.

"Paul Dresser, who has more successes to his credit than any other song writer in the business, has a novel way in getting themes for his compositions. He is a very thrifty fellow and a business man, too. He is a member of a local publishing firm and, of course, has no trouble in finding a market for his manuscript. Paul Dresser was very critical. He wrote 'The Parson That Came too Late,' 'Just Tell Them That You Saw Me,' 'Here Lies an Actor,' 'Down on the Wabash, Far Away,' 'Don't Tell Her That You Love Her,' 'Take Me Back to New York Town,' and 'The Blue and the Gray.' 'Just Tell Them That You Saw Me' was very popular. One day Dresser met a man of an old friend in front of the Morton House in Union Square. He had known the young man in a village in the West, and was surprised to see the young fellow. The young man was in ill health and hard up.

"'Well,' said Dresser to the son of his old friend, 'I'm going home to —— to-morrow and if you have any message to give to the old folks I will be very glad to deliver it. What shall I say?'

"'Oh,' replied the young fellow with a touch of pathos in his voice, 'just tell them that you saw me, and that I was looking well.'

"This was far from the truth, because the young man was pale and looking ill. Dresser, after giving the fellow some money, bade him good-by and the two parted. Dresser then wrote the song, using the same expression that the young man had used, viz., 'Just tell them that you saw me.' He changed the story around a bit and made the real character a woman who had fallen. Paul told me that the young man never lived to return home, for he died a few months after the song was published. Dresser wrote Sothern's hit song, 'Just After the Burial of the late John McCullough, the tragedian.

"'The Sunshine of Paradise Alley' was inspired mostly by accident. Walter Ford and John Bratton were walking west on Market street, Philadelphia, one gloomy day, trying to think of some appropriate music for a song. Midway between Sixth and Seventh streets, Bratton suddenly paused and looked up at an old half-obliterated street sign on the side of a building.

"'There's an odd name for such a dingy court, Paradise alley,' said Ford. 'Let's go up there and take a look at it and some material.'

"Accordingly the two sauntered up the half block, and for squalor and poverty it seemed that the limit had been reached. As they turned to go back to Market street a little girl about 12 years old came out of the tumble-down hovel, a shawl over her yellow curls and a battered tin dinner pail in her hand. It needed but one glance to show them that she was the little mother of some struggling family. She started back at seeing strangers and soon disappeared.

"'Come on, Jack,' said Ford, 'there's a song at last,' and then they wrote the 'Sunshine of Paradise Alley.' 'Only Me,' which was also written and composed by the same pair, was suggested by an incident which happened at Sheepshead Bay. Ford was visiting a family at that place, and after dinner Mrs. L—— proposed some music in the parlor. Two little girls, one 7 and the other 4, were playing in an adjoining room. In the midst of a song one of the children overturned a chair with considerable clatter. The mother called reprovingly:

"'Was that you, sweetheart?' meaning the younger child.

"The answer came back plaintively 'No, mamma, it was only me.'

"In a moment the unconscious favoritism was apparent. The ungrammatical acknowledgment of the mishap, so hopelessly given, seemed to lay bare a child's heart that was yearning for some of the mother's pet phrases. The song followed, and Mrs. L—— has never forgiven Ford and Bratton.

"Jimmy Thornton wrote his song, 'When You Were Sweet Sixteen,' one night after a spat with his wife, Bonnie Thornton. Mrs. Thornton had accused her husband for something he had done and accused him of growing cold toward her.

"'Why, Bonnie,' he said, much surprised, 'how can you say that? I love you the same as when you were sweet sixteen.'

"The title of the song, 'My Sweetheart's the Man in the Moon,' was suggested by Morton one night while riding on a surface car. The sky was clear, and one of the passengers, a woman, looked out of the window and peered at the moon. Then, nudging her escort, she sarcastically said:

"'I don't care for you any more. My sweetheart's the man in the moon.'

"'She May Have Been Better Days,' another of Thornton's compositions, was written after Jimmy had witnessed a scene on Sixth avenue. A woman who seemed to be quite young, but dissipated looking, was sitting in the gutter in apparent stupor when Jimmy and a noisy crowd had gathered and jeered her and made life miserable for her. Before a policeman arrived a well-dressed old man stepped into the crowd, and turning to a tough-looking fellow who had been her principal tormentor, said:

"'Where is your mother? You leave the woman alone? If she's unfortunate I'll bet she may have been better days.'

"It did not take Thornton long to realize that he had a good title and a few days afterward he sold the song for a tidy sum.

"Billy Gray got his material for his famous song the 'Church Organist' while attending church one Sunday morning. It seems on that particular day the regular organist was ill and the congregation was not informed of this fact until late in the service. The preacher was in a quandary and was about to give up in despair when a dilapidated-looking fellow, much the worse for rum, entered the church. He took a seat near the aisle and began to pray. Then he staggered toward the organ and said to the preacher:

"'Will you let me play on the organ for a few minutes? I want you to hear a few songs.'

"The parson was dumfounded, yet pleased. He turned to the stranger and after critically sizing up his appearance said: 'Yes, my son, you can play. Our regular organist is ill to-day and I will thank you very much if you will volunteer.'

"Well, the stranger knew his business and discoursed some of the sweetest melodies Gray ever heard. Gray, inside of two days, wrote a song around the incident and published it himself. It had a big sale and he made thousands of dollars out of it.

"The originator of cake walk music is Fred Mills, who writes under the name of Kerry Mills. One night about six years ago Mills attended a cakewalk in Detroit. The leader of the band, a negro, had considerable difficulty in keeping the walkers in step. Mills, who was just budding out as a composer, approached the leader and said:

"'I notice that the walkers here to-night can't keep in step. I composed a march which I think will do. Try it. It's called "Rastus on Parade."'

"The leader played it and the effect was magical. The contestants were able to cakewalk without much trouble to the time of the music. Although the leader tried to ring in some other music the darkies insisted on 'Rastus on Parade' and it at once became popular. Mills then composed 'Cooper Campmeeting,' 'Happy Days in Dixie' and 'Whistling Rufus,' from which he made a fortune.

"John Kelly, who wrote and composed 'The Girl I Left Behind,' got his idea while starring with his company out West years ago. One night the leading soubrette of his show got into a row with another member of the troupe and gave notice to Kelly that she would leave. Kelly was much worried because he could not get another woman at that time to fill her place. Kelly pleaded with her to remain, but she refused and left the next night. About two days later she repented and came back. Kelly gave her her old job, but planned at the same time to get even. So at the next stand he paid her what was coming to her and discharged her. Then gathering his entire company together he said: 'See, that's the girl I left behind.'

"I could continue all night and tell you about the history of hundreds of other popular songs, which would be equally interesting. Dave Marion, who composed only 'One Girl in the World for Me,' says that he got the theme of this song from reading the Bible. He says that Adam said to Eve: 'There's only one girl in the world for me.' I guess Dave meant to be funny, but he swears it is a solemn fact. At any rate the song was the real thing whether the Bible inspired it or not."

BOSS TWEED'S DIAMONDS.

Bishop Potter's Story of a Diamond Suspender Button—A Joke on Tom Fields.

Bishop Potter said recently that a friend of his picked up a diamond as big as his thumb in the office of Boss Tweed one day and that it turned out to be one of the Boss's suspender buttons.

"Now, with all due respect to the Bishop's friend, I do not believe that diamond story," said a man who saw much of Tweed in his days of power. "Had the old man ever worn a diamond suspender button I certainly would have known of it. The fact is, the only big diamond the Boss ever displayed was a large solitaire that he never failed to have in his expansive shirt front. Tweed was a jolly old dog and often in his stuttering way used to get off some queer remarks just for effect or as a guy on his hearers.

"It would have been just like him to say when his diamond solitaire was picked up by the Bishop's friend: 'Oh, that's only a suspender button of mine; I didn't miss it.'

"This suspender button story puts me in mind of a genuine diamond tale about the Boss. Tweed's spokesman on the floor of the Assembly was Thomas C. Fields of this city. He was the Boss, wore a large diamond in his shirt front. But it had a little chain and pin attachment to it that the Boss's diamond had not. One evening Field had dined, not wisely, but too well, and during the sitting of the Assembly fell into a heavy slumber with his head on his desk. Alex Frear was also a member from this city. He saw that certain bills could not be handled properly unless Fields had a clear head, so he got the Speaker, Billy Hitchman, to secure the passage of a motion to adjourn. John J. Blair and Billy Cook, members from this city, quietly got possession of Fields's diamond pin. Then the lights in the Assembly chamber were turned low and Fields was left sleeping there.

"It was dawn the next day when Fields woke up. Fields rubbed his eyes, stretched himself, yawned and then looked around. He said nothing, but quietly walked out and down State street to the Delavan. When he turned in at breakfast Boss Tweed and Alex Frear were already at the table and so was Hitchman. Fields was wild. He had missed his diamond when he got to his room. He had already gone to Police Headquarters and told how he had been robbed. He said that while not feeling well he had gone into the Assembly Chamber and imagining that there was to have been a night session, he had taken a ten minutes' nap and that during that time some one who must have followed him had taken his diamond. Fields told his story at the table and raged like a madman about the loss of his pin.

"'Well, Fields,' said Tweed, 'what made you think there was to be a night session and go to the Assembly chamber at all?'

"'Hanged if I know,' said Fields, 'but——'

"At this stage of the proceedings Boss Tweed pulled at his napkin which he had the habit of tucking under his big double chin. There on the Boss's big white shirt front glistened Fields's diamond, made unmistakable by its little gold chain and pin.

"There was a general laugh all round the table. No; Fields did not laugh. Half raising himself up from his seat with his fat face blushing as red as a beet he exclaimed in a voice that could be heard all over the dining room:

"'Tweed, I always knew you were the damnedest thief on record, but before this session is over I'll make you pay me in cash ten times the price of that pin.' Of course Fields got his pin.

"At the close of the session one night he was with Alexander Frear and Speaker Hitchman enjoying a cold bottle in a corner of the Boss's room at the Delavan. Putting his hands into his pocket he drew out a roll of white tissue paper. 'Sa-a-y,' said he to Hitchman, with a laugh, 'a month ago I told Tweed he'd pay heavy cash for that pin business, didn't I? Well, I compromised, and he unrolled the paper and exhibited three immense solitaire diamonds, worth, it was afterward learned, $3,500. So the joke on Fields proved a costly one to Boss Tweed. Fields had finally made Tweed believe that he would kill one of his pet bills if he did not settle in that diamond way.

"Let me say this: No one who knew the way the Tweed ringsters revelled in money in those days would think the diamond suspender button an impossibility. Diamonds were worn in profusion by all the Tammany officials and the bigger the diamond the bigger the man in the estimate of the heelers. It is said that many men in the Legislature who helped Tweed in 1871 to pass certain ring measures were paid with diamonds. One of them, it is said, once remarked to the head of the lobby of that day: 'Checks can be traced and bills can be marked and gold eagles nicked for future identification, but valuable, unset diamonds tell no tales out of school.'"

WHAT MODERN SAILORS FEAR.

Not Winds and Seas, but an Explosion Which Sends the Ship to the Bottom.

From the New Orleans Times-Democrat.

"Boiler explosions are the terror of the seafaring man," said an old-time deep-water captain, speaking of the frightful disaster at the carbolineum works. "Such a thing is bad enough on dry land, but imagine a catastrophe of that kind at sea! In ninety-nine cases out of a hundred it means the absolute wiping out of the craft itself and every soul on board.

"The average landsman would be greatly shocked in looking over the maritime records to see how many vessels disappear each year and leave absolutely no clue to their fate. They run well up to the hundred mark, and such a mystery is not to be explained away by storms. A furious typhoon may sweep down upon a helpless craft, darken the sky and tear a ship to pieces, but some floating wreckage is sure to tell the tale. A boiler explosion, on the contrary, will blow a hole as big as a railroad tunnel right through the centre of the hull, and the stricken vessel simply goes down like a shot. There is no time to inflate a boat from the davits or cut loose a spar.

"In the opinion of seamen, that is the story of at least 90 per cent of