ABSTRACTS.

GENERAL AND INORGANIC CHEMISTRY.

On Nitrification.—PART III. R. WARRINGTON.

A summary of results obtained at Rothamstead during the last few years in continuance of previous work. Nitrification is produced by an organism which the author now believes to be a bacterium. The evidence that an organism is the agent in nitrification is now so strong, that the burden of proof is thrown upon those who deny the statement. The process may be started at will in any suitable solution by addition of a nitrified material, while such solutions, unseeded, remain sterile for years. Phosphoric acid is essential to the continuance of the process as it is to the existence of life. The range of temperature within which nitrification is possible, is the same as that which limits the vitality of low organisms, and the process requires presence of the plant food suited to such organisms. Antiseptics are fatal to nitrification; a temperature of 100° C. is also fatal. The process may be permanently arrested in sewage, by boiling, if introduction of foreign matter be subsequently prevented, but is started at will, after boiling, by the introduction of a nitrified solution. Finally, the theory that nitrification in the soil is due to condensation of gases in the pores of a soil by which an exceptionally active oxidation is brought about, is overthrown by Schloesing's experiments, which show that such gases occupy normal volumes.

All of the Rothamstead experiments of this series were made with solutions. Those most commonly employed contained ammonium chloride, 80; sodium potassiums tartrate, 80; potassium phosphate, 40: and magnesium sulphate, 20; the numbers representing mgms. per litre. Calcium carbonate or gypsum, or in some cases, tricalcium phosphate, was added. Diluted urine, (4 c.c. per litre) was also used. All the solutions were sterilized by heating to near 100° C. for 6–8 hours, and then seeded with natural soil or a nitrified solution.

The nitrifying power of the soil at different depths was determined by taking samples of earth, with proper precautions, from the side of an excavation in a cultivated field, at stated depths from the surface, down to nine feet. The organisms in question are shown to exist mainly within nine inches of the surface in a clay soil, rarely extending below 18 inches, and never, so far as these experiments show, below three feet.

All nitrogenous substances which yield ammonia by the action of organisms in the soil, are nitrifiable. Nitrification is limited by excessive alkalinity of the medium as has been shown by others. Under given conditions, an alkalinity equal to 160–200 mgms. of disodium carbonate per litre was favorable to the process, while 320 mgms. or more proved unfavorable. Strong urine is, therefore, unfit for nitrification, a fact which has an important bearing upon the use of liquid manures. Apart from alkalinity, also, concentration of ammoniacal solutions has an influence upon nitrification.

The rate at which nitrification proceeds depends also upon the vigor of the organism, which, in turn, rests upon the conditions of nutrition, access of oxygen, etc., in its previous development and in its ancestry. Depth of solution, connected as it is with access of oxygen, has an important influence upon nitrification. In porous soil the process is much more favored in respect to oxygen than it can possibly be in solutions. Organic carbon is essential only as it is required for the nourishment of the organism, and excess is rather prejudicial, because it tends to appropriate a part of the necessary oxygen. Urine contains sufficient organic carbon for its own nitrification. Nitrification may go on slowly at temperatures as low as 3.2° C.

When a fresh sample of nitrified soil is added to a nitrifying solution, the first effect is a reduction of nitrates, already present, to ammonia. This reduction runs its course more quickly than the subsequent nitrification; it is accompanied by turbidity of the solution, and has been shown by Dehérain and Maquenne to be caused by bacteria.

As to the theory of oxidation of ammonia to nitric acid in the human body, the author has made direct experiments, in which the absolute quantity of nitric nitrogen eliminated in equal times was determined, while stated quantities of ammonia salts were taken into the system. The results lend no support to a belief in such oxidation of ammonia. A. A. B.

On Germination in a Soil Rich in Organic Matters, but Free from Microbes. E. Duclaux.

The destruction of the organic matter of soils by microbes, and the production on such soils of new vegetation are phenomena which always occur together. Hence the inquiry whether plants can develop in the absence of microscopical organisms. In other words, could the plant, without such organisms, utilize the organic matters left in the soil by preceding plants? This problem depends on this other problem. If a seed is sown in a soil rich in organic matter, but free from microbes, can it utilize manure placed in this soil?

Among substances which can be offered to a seed as manure, the author has chosen milk, which contains a carbohydrate, milk sugar, and a nitrogenous substance, caseine. The author has previously shown that milk is only assimilated by animals after treatment by two ferments—rennet and casease.

The author operated on two seeds, peas and beans. These were freed from microscopical organisms and planted in a sterilized soil moistened with sterilized milk.

At the end of two months, the milk remains unchanged—it has not been coagulated and its caseine can be precipitated by acids.

With solutions of rock candy and with starch paste, analogous results have been obtained. The plants produced from seeds in such conditions are exactly as if grown in pure distilled water. The weight of each plant is less than that of the seed from which it grew.

In presenting the above paper, M. Pasteur made the following remarks:

"Often in our laboratory conversations, I have called the attention of young scientists to the interesting results which would be obtained by feeding a young animal, from its birth, with substances pure from microscopical organisms. If I undertook this study it would be with the expectation that life, under such conditions, would not be possible. If such experiments were undertaken it would be well to try the influence on digestion of the addition of any particular microbe or of an association of known microbes of various kinds. Hen's eggs would afford a very convenient agent for such experiments. The egg should be deprived of all living

dust, at the moment when the chick is to appear. This should be placed in a space free from germs. The air should be renewed in this space, but all the air introduced should be freed from germs. All the food introduced should also be freed from germs (water, milk, seed.) The result of this experiment may either confirm my preconceived ideas, or it may show that life is not prevented, or that it takes place even more actively than usual. At any rate, the result obtained would be interesting." (*Comptes Rend.* **100**, *66.*)
P. C.

An Explanation of Gladstone and Tribe's "2-3 Law in Chemical Dynamics." J. W. LANGLEY.

"In a paper by Gladstone and Tribe on "A Law in Chemical Dynamics" (*Jour. Chem. Soc. 1871, p. 1123*), it is stated that, if a plate of metal be suspended in a solution of a salt of another metal which it precipitates, the percentage of salt in solution will be to the rate of chemical action as the powers of 2 to the corresponding powers of 3. This is the "2-3 law" referred to, and it has been found to hold good for solutions of 3 per cent. or less. No explanation of it has been given, and the author of the present paper has sought to distinguish between the chemical and physical elements of the problem, and to define the value of each. To test the influence of the products of chemical action upon the rate and continuance of that action the suspended plate (of copper, in a solution of silver nitrate) was slightly curved and made to revolve in the solution so as to present fresh portions continually to the action of the plate and thus to give the effect of more rapid removal of the solution of copper than was effected by gravitation in the case of the stationary plate. The experiment was varied also by the use of a revolving brush which swept one surface of the stationary plate (the other surface being varnished) at a uniform speed, and by revolving the precipitating vessel itself in a vertical plane at such a rate that the tendency to remove the products of chemical action from the plate was 30 times that of gravity. The results show that the rate of action is dependent both upon the strength of the salt solution and upon the rate at which the products of chemical action are removed from the surface of the plate. As the stronger solution produces more rapid action it yields also a denser product, which falls away more rapidly, and, for given conditions, within the limits of the original experiment, the law can be shown to be a necessary result. That this is true only for conditions in which gravity effects the removal of the products of chemical action from the plate, is demonstrated by the departure from the law in the case of the centrifugal experiment. The whole question is one relating to the influence of mass upon chemical action. The author concludes that the true law of chemical action in such cases as this "should be that the time during which one atom replaces another is constant and that the total chemical action varies directly as the mass of the reacting body in solution.—(*Jour. Chem. Soc.*, **265**, *633*).

A. A. B.

The Use of Boiling Oxygen as a Means of Cooling, and the Solidification of Nitrogen. S. V. Wroblewski.

Oxygen does not solidify when brought to boiling by sudden release from pressure. It leaves, however, a crystalline precipitate upon the bottom of the containing vessel or any object plunged in it. Further research is needed to decide whether these are oxygen crystals or the impurities in the gas. This deposition of crystals interferes somewhat with its use for cooling. A second obstacle is the necessity for using very strong, closed vessels. Only the moment of violent boiling when the pressure is removed can be utilized. This is of very short duration and presents another obstacle. The temperature of boiling oxygen, measured by a thermoelectric method, was 186° C. As yet nitrogen only has been cooled in this way successfully. It solidifies and falls in flakes which consist of crystals of notable size. (*Jour. f. prakt. Chem.*, **29**, *95*.)

F. P. V.

Solubility of Solid Bodies in Water at Different Temperatures. J. L. Andreas.

The solubilities of some of the commoner solids, determined by distinguished experimentors, show decided differences. The author points out certain courses of error, as proper shaking, regulation of temperature, inaccurate thermometers, and purity of solid. In a series of experiments he seeks to avoid these errors, determining the solubility of sodium chloride, potassium sulphate and potassium nitrate. (*Jour. f. prakt. Chem.*, **29**, *456*.) F. P. V.

Modifications of Sodium Sulphate. S. U. Pickering.

From the discrepancies in existing data relating to the heat of solution of metallic sulphates, the author was led to suspect the existence of modifications of the same sulphate, and the present paper is an attempt to show that anhydrous sodium sulphate exists in at least two different conditions. The molecular heat of solution for samples prepared by drying the effloresced, crystalline salt at different temperatures is approximately constant for samples dried at or below 150° C.; dried between 150° and 200° C. the salt shows a remarkable rise in heat of solution, reaching, however, at temperatures somewhat above 200°, a value which is constant up to the fusing point. The discrepancies in the results of Berthelot and Thomsen may have resulted from the use of mixtures containing different proportions of the two modifications. The heat of solution of the fused salt presents anomalies which require further investigation. (*J. Ch. Soc.*, **265**, *686*.) A. A. B.

The Origin of Calcium Thiosulphate. E. Divers.

The action of the atmosphere upon calcium polysulphides (decomposition of soda waste) involves no direct oxidation of sulphur, but a splitting up of these compounds by hydrolysis into sulphur, H_2S and lime. H_2S is then oxidized only in respect to its hydrogen, the free sulphur reacting upon calcium hydrate to produce calcium thiosulphate and hydrosulphide.

$$3\ CaH_2O_2 + 12S = CaS_2O_3 + 2CaS_5HOH.$$

By dissecting this reaction, however, it may be shown to involve a preliminary reaction in which SO_2 is set free. The union of calcium sulphite and S to produce thiosulphate is a well known reaction and as the one other method of obtaining thiosulphate (the action of SO_2 on a hydrosulphide) involves a similar reaction, the author concludes that the origin of the thiosulphate in all cases rests upon one common reaction, viz.: *the union of sulphur with calcium sulphite.* (*J. Ch. Soc.*, **265**, *696.*) A. A. B.

ORGANIC CHEMISTRY.

On Uric Acid. E. Fisher.

Uric acid methyl-ether on being treated with phosphoric chloride loses two atoms of hydrogen and two of oxygen which are replaced by two Cl atoms, thus :

$CH_3 - C_5N_4H_3O_3 + 2PCl_5 = 2HCl + 2POCl_3 + CH_3 - C_5N_4 HO Cl_2$.

In this chloride one hydrogen atom may be replaced by CH_3 and moreover, the two chloride atoms by H, etc. By prolonged treatment with P Cl_5, the compound CH_3—$C_5N_4HO Cl_2$, loses H and O again, and is converted into the tri-chloride CH_3—$C_5N_4 Cl_3$. In this, as in the previous compound, the Cl atoms may be replaced by various radicals.

The author regards these compounds as derivatives of the hitherto unknown hydrogen compound CH_3—$C_5N_4H_3$, which he calls methylpurine. Among the compounds enumerated are the following : Dichloroxymethylpurine, trichlormethylpurine, oxymethylpurine, dichloroxydimethylpurine, oxydimethylpurine, ethoxychloroxydimethylpurine, dioxydimethylpurine, diethoxydimethylpurine, trioxydimethylpurine. (*Ber. d. chem. Gesell*, **328**, *1884.*)

J. H. S., Jr.

On the Presence of an Isocyanide (Carbylamine) in the Lighter Portions of Commercial Benzol. E. Noelting.

These light distillates, known techincally as "heads," have been shown by different investigators to contain carbon disulphide, crotonylene, amylene, hexylene, ethylic alcohol and acetonitrile or methyl cyanide, in addition to more or less benzol. The author has noticed the odor of an isocyanide in this product and finds on examination that this odor disappears on treatment with HCl, giving place to the odor of CS_2, while the liquid, after this treatment, is found to contain ammónium chloride and a small quanity of a hydrochloride of primary amine. The proportion of isonitrile is evidently very small but the odor of these bodies is strong and characteristic, and their poisonous properties very marked. The low boiling points of the "heads" excludes all of these bodies except methyl- and ethylisocyanide, which boil respectively at 59.6° and 78.1° C.

The application of this product ("heads") is very limited. It has been used to dissolve caoutchouc, for which purpose, however, the naphthas of 120°–150° C. are preferred. In a note, M. Werner describes a fatal case of poisoning of a workman who inhaled the vapors of this same benzine, and experiments, made jointly with the author, upon animals, pointed to the isocyanides above mentioned as the cause of death. *(Bul. Soc. Ind. Mulhouse, Oct. 1884.)* A. A. B.

Occurrence of Citric Acid in Seeds of Leguminous Plants. H. Ritthausen.

The existence of citric acid, together with malic and oxalic acids, in the seed of the yellow Lupine (*Lup. luteus*) has already been shown. The author finds it also in the seed of *Vicia sativa* (vetch), *V. faba* (hog's bean), various varieties of peas, and in the white garden bean (*Phaseolus*). The powdered seeds are digested with water acidified with hydrochloric acid, the solution filtered, neutralized with an alkaline hydrate, and precipitated with lead acetate. This is suspended in water, treated with sulphuretted hydrogen, and the citric acid gotten in the usual way from the acid liquid. The white bean contains very little citric acid and peas contain less than the other legumes mentioned. *(Jour. f. prakt. Chem.,* **29**, *357.)* F. P. V.

Melitose in Cotton-Seed. H. Ritthausen.

The cotton-seed cake is treated with 80 per cent. alcohol (60–70° C.), the excess of alcohol distilled off, the residue freed from fat by means of ether, the remaining coloring matter precipitated with basic lead acetate and ammonia, and the excess of lead removed by sulphuretted hydrogen. Needle-like crystals of melitose are deposited on evaporating the solution, and these may be washed and recrystallized. The crystals, which form about three per cent. of the crude material, seem, on examination, to possess all of the properties of melitose. *(Jour. f. prakt. Chem.,* **29**, *351.)*

F. P. V.

On Paranitrobenzoylacetic Acid. W. H. PERKIN, JR., and GUSTAV BELLENOT.

It has recently been shown by Baeyer that phenylpropiolic acid ether, when treated with H_2SO_4, takes up the elements of water and is converted into benzoylacetic acid ether. The authors thought it of interest to see whether, under the same conditions, paranitrophenylpropiolic acid ether, would be converted into paranitrobenzoylacetic acid ether. This was found to be the case. After some experimenting they obtained a compound which analysis showed to be paranitrobenzoylacetic acid, formed according to the reaction:

$$C_6H_4(NO_2)-C{\equiv}C-COOC_2H_5+2H_2O=C_6H_4(NO_2)CO-CH_2-COOH+C_2H_5OH.$$

The ether was obtained from the above, by dissolving the free acid in absolute alcohol, and saturating with HCl. The temperature during this treatment should not exceed 10° C. (*Ber. d. chem. Gesell,* **326**, *1884.*) J. H. S., Jr.

On the Action of Aldehydes and Ammonia on Benzil. (Continued.) F. R. JAPP and S. C. HOOKER.

The reaction between salicylaldehyde or furfuraldehyde and benzil in presence of ammonia, differ from reactions of this class previously studied by the authors. The two carbon atoms of the dicarbonyl group instead of becoming doubly linked, separate in such a way that the diketone is broken into halves, which become two substituted acid radicals in the new compound. At the same time the two aldehyde residues become linked by means of the carbon atoms of the CHO groups. The salicylaldehyde compound has been especially examined. When equal weights of salicylaldehyde and benzil are dissolved with aid of heat and the solution saturated with gaseous ammonia, a lemon-yellow, crystalline compound is separated, which has the composition $C_{28}H_{24}N_2O_4$, and treatment of this with dilute HCl in sealed tubes at 210° C. yields a new base, dihydroxystilbenediamine. The original compound is dibenzoyldihydroxystilbenediamine, a substitution product of this base, and was subsequently obtained by synthesis. (*J. Ch. Soc.*, **265**, *672.*) A. A. B.

On the Introduction of the Azo-Group, in the so-called Aromatic Para-compounds. P. Griess.

(*Ber. d. chem. Gesell*, **338**, *1884.*) J. H. S., Jr.

On the Existence of the Trimethylen Ring. W. H. Perkin, Jr.

(*Ber. d. chem. Gesell, 323, 1884.*) J. H. S., Jr.

On a new Synthesis of Anthrachinone. By W. Panatovits.

Anthrachinone is obtained by the dry distillation of calcium phthalate.—(*Ber. d. chem. Gesell., 312, 1884.*) J. H. S., jr.

* * *

ANALYTICAL CHEMISTRY.

On the Separation of I and Cl in the Dry Way. J. Krutwig.

On heating a dry mixture of KI and potassium bichromate (in excess), the I is completely expelled, and chromic oxide, potassium monochromate and bichromate remain behind, viz.: $6KI + 5K_2Cr_2O_7 = 6I + Cr_2O_3 + 8K_2CrO_4$.

For the analysis, the KI is weighed out in a porcelain crucible. Six times as much $K_2Cr_2O_7$ is added, well mixed, with the KI, and the crucible again weighed. The crucible is then slightly heated until fumes of iodine cease to escape. This takes about 30 minutes. The crucible is weighed again, and the amount of iodine present calculated from the difference. The I may also be estimated from the amount of Cr_2O_3 formed, as follows . The melted mass is treated with water in a beaker, and heated for a short time on the water-bath. K_2CrO_4 and $K_2Cr_2O_7$ are quickly dissolved, and $Cr_2\ O_3$, which remains, is collected on a filter, washed and weighed. NaCl, on the contrary, is not attacked by $K_2Cr_2O_7$.

It is therefore possible to separate a mixture of KI and NaCl, by heating them in a porcelain crucible with $K_2Cr_2O_7$. The I is estimated as above, and Cl by acidifying the filtrate from the Cr_2O_3 with HNO_3, and precipitating with $AgNO_3$. (*Ber. d. chem. Gesell*, **341**, *1884.*) J. H. S., Jr.

Fractional Distillation in a Current of Steam as a New Means of Investigating Naphtha. (*Preliminary notice.*) RASINSKI.

Steam is conducted from a boiler to the bottom of the distilling flask (not otherwise heated). The mixture of steam and hydrocarbon vapor is dephlegmated by cooling in tubes and by washing in Mendeljeff's dephlegmators (from one to three in number). These latter are not heated. The mixed vapors coming from the last dephlegmator are collected, after condensation, in quantities of 65–70 c. c., and for each such fraction the specific gravity and the ratio of water to oil (by volume or weight) determined. The numbers thus found serve as co-ordinates for the curves representing the results of each distillation. The fractioning depends upon the peculiarity of these hydro-carbons that, when thus distilled, the ratio between the quantity of oil and of water used in distilling varies with the specific gravity of the oil. Fractions with increasing specific gravities may thus be secured without risk of decomposition. (*Jour. f. prakt. Chem.*, **29**, *41.*) F. P. V.

Determination of Morphine in Opium. V. PERGER.

On comparing the methods of E. Merk, Hager-Godeffroy, the *Pharmacopœa Austriaca*, ed. VI., and the one proposed by himself, the author finds most surprising differences in results obtained. The author's method is as follows : The opium is heated with barium hydrate and water, filtered, and washed with hot water. The filtrate, containing all morphine, is saturated with carbon dioxide and the whole rapidly evaporated to dryness on a water-bath. The dried mass is extracted with absolute alcohol and the alcoholic filtrate freed from alcohol by distillation. The residue is allowed to stand some time with ammonia water, brought upon a filter, washed with water containing ammonia, then with chloroform, then dried and weighed. This crude morphine may be purified by dissolving in acetic acid, adding a few drops of potassium ferrocyanide, filtering, neutralizing the filtrate with ammonia and allowing the morphine to crystallize out, collecting the crystals upon a filter, drying and weighing. (*Jour. f. prakt. Chem.*, **29**, *97.*) F. P. V.

Abstract of American Patents Relating to Chemistry.

(From the Official Gazette of the U. S. Patent Office.)

January 6th, 1885.

310,164.—Furnace for the manufacture of iron direct from the ore.—C. Adams.

310,187.—Apparatus for refining sulphur.—F. Dickert.

310,192.—Fibrous pulp roofing pile.—J. F. Edson.

The fibrous pulp is pressed in moulds and dried, after which it is impregnated with a waterproof solution, and coated with a fireproof enamel.

310,205.—Fabric for covering heated surfaces.—H. W. Johns.

Consists of ropes or rolls of fibrous materials, woven with sheets of paper, sheathing, &c.

310,275.—Colored waterproof fabric.—T. Hawley.

310,302.—Process for the separation of metals.—B. Moebius.

This is a process for refining silver by electrolysis. The alloy as an anode is subjected to an electric current in a solution of nitrate of silver, nitrate of copper, and nitric acid.

310,334.—Asbestos paper.—S. Tingley.

A sheet of asbestos paper is covered on one or both sides with thin paper, coated with a salt, which will form a glaze when heated to high temperatures.

310,339.—Method of manufacturing hydraulic grape sugar.—L. Virneisel.

Consists in forming a magma of crystals of grape sugar hydrate from starch glucose, mixing the magma with a thin solution of grape sugar and draining.

310,376.—Apparatus for the manufacture of prussiate of potash.—E. R. Carhuff.

Not intelligible without illustration.

310,403.—Evaporating pan and furnace.—C. W. Frick.

Adapted for cooking two lots of juice at one time. Not intelligible without illustration.

310,404.—Fire extinguishing compound.—F. Frohlich.

Consists of an alkaline silicate, alum, common salt, and phosphate of ammonia.

310,410.—Incaustation preventive.—H. Gyrard.

Malt sprouts are distilled and the resulting liquor is added to the water in the boiler.

310,448.—Process of and apparatus for baryta or strontia treatment of saccharine liquors, and production and recovery of these reagents.—H. Leplay.

310,454.—Metallurgical furnace.—W. McKenna.

This furnace is adapted for burning gas.

310,461.—Non-conducting composition for refrigerators.—J. M. Ordway.

Consists of a non-conducting coating of granulated cork, bark, or pith, agglommerated with water glass, in combination with a lining of fossil meal or magnesia.

310,486.—Producing gelatinous and printing plates.—W. Woodbury.

Consists in producing a photographic design in gelatine plates, then drying and mounting them on solid backs, and coating the surface with tin foil. By subjecting this to pressure a metallic printing surface is obtained, which may be electroplated.

310,487.—Apparatus for the manufacture of gas.—A. L. Allen.

A current of steam or super-heated steam is passed continuously through a mass of highly heated carbon of gradually increasing temperature, and finally through one or more independent masses of incandescent carbon of equal temperature with the final temperature of the decomposing retort.

310,497.—Process of and apparatus for the fractional distillation of petroleum.—R. Dean.

Not intelligible without drawing.

310,500.—Process of constructing lead vessels.—H. Egells.

The body of the vessel is constructed of one of the harder alloys of lead—such as type metal—and lead is directly fused upon the surfaces to be exposed to corrosive action.

310,533.—Apparatus for the electrolytical separation and deposision of metals.—B. Moebius.

310,544.—Apparatus for manufacturing flexible roofing material.

January 13th, 1885.

310,550.—Lime paint.—W. J. Adams and W. R. Polk.

A lime paint consisting of lime, salt, alum, syrup, and a gluey substance.

310,560.—Preparation of a fluid for making water repellent fabrics.—A. B. Conger.

Caoutchouc or other elastic gum is treated with gas of nitric or muriatic acid, and dissolved with paraffin or wax in naphtha or other mineral oil.

310,594.—Process of manufacturing asphaltic powder suitable for paving. —H. Kettmann.

Asphaltic concretes are made by mixing asphalum or bitumen with pulverized material, while the latter are suspended in water.

310,604.—Manufacture of isatins and substituted isatins.—P. J. Meyer.

The isatins and substituted isatins are obtained from dihalogenized acetic acids, their salts, amides, ethers, and aldehydes or from amines, by directly fusing or boiling their solutions, and treating the product with a strong acid.

310,619.—Ore furnace.—E. F. Russell.

310,625.—Composition for granite or gravel roofing.—F. Vaughan.

A mixture of linseed oil, resin, pitch, beeswax, and carbolic acid.

310,744.—Gas retort.—A. C. Swain.

Not intelligible without drawing.

310,758.—Treatment of yucca or "sotal" fibre for the production of paper pulp or stock and obtaining by products therefrom.—G. B. Walker.

The fibre is steeped in acid sulphite liquors, then digested in borax liquor and sulphurous acid, and finally washed in a weak soda solution.

310,759.—Limekiln.—A. B. Weeks.

310,804.—Glass furnace.—J. V. Ebel.

January 20th, 1885.

310,887.—Fire-Extinguishing Compound.—J. M. Giblin.

A vessel of glass, or analogous frangible material, containing liquefied sulphurous oxide.

310,888.—Fire-Extinguisher.—J. M. Giblin.

310,889.—Fire-Extinguishing Compound.—J. M. Giblin.

Consists of a solution of sulphurous oxide, in an alkaline liquid.

310,899.—Plastic compound suitable for molding into various useful articles.—M. Mackay.

Consists of lac, gum sandarac, rosin, ivory, black, and asbestos.

310,901.—Process of making ferronickel and ferrocobalt.—H. Marbeau.

Mats or pigs of these metals are fused with potassium ferrocyanide or cyanide and one of the oxides of manganese, and at the moment of casting a small quantity of aluminium is added.

310,925.—Thermometer.—H. Weinhagen.

A dark, light-absorbing shield is placed behind the mercury column.

310,957.—Manufacture of compounds to be used for insulating.—A. Muirhead.

Consists of a mixture of purified paraffin wax or other hydrocarbons and gutta percha.

310,963.—Spirit Condenser.—F. Sonier.

Not intelligible without the drawings.

311,013.—Ice machine.—J. C. Kitton.

311,028.—Refrigerating machine.—A. Osenbrueck.

311,058.—Ore roasting furnace.—J. F. Carter.

311,062.—Refrigerating apparatus.—N. W. Condit, Jr., and T. Rose.

311,118.—Manufacture of amber varnish.—J. W. Goussen.

The amber is ignited upon a wire cloth, and allowed to drip through the cloth, after which it is boiled with the oil, and finished in the usual manner.

311,124.—Process and apparatus for making gas.—J. Hanlon.

312,125.—Process and apparatus for making gas.—J. Hanlon.

Illuminating gas is made by continuously heating the generating retorts by the combustion of gaseous products from a producer, and such products, after partial combustion, are used for alternately heating internally two fixing-chambers. Gas is generated continuously in the retorts, by passing superheated steam down through a body of charcoal, where it is decomposed, passing the resulting gas up through the vaporizing chamber, into which oil is admitted, and then passing the mixed gas and oil vapor through one of the heated fixing chambers, where they are converted into a fixed gas. One of the fixing chambers is being heated up while the other is used for fixing gas.

311,135.—Recovering rubber from rubber waste.—C. I. McDermott.

The fibre is removed from fibrous rubber waste or scrap, by treating with dilute acid, or acid containing materials for generating nascent chlorine.

311,156.—Manufacture of artificial stone compositions.—C. I. Walker.

Lime and silica are ground to powder and intimately mixed. The lime is then slaked and sand or gravel is added.

January 27th, 1885.

311,203.—Composition of matter for water proofing.—I. V. Reagles.

The composition consists of wood alcohol, castor oil, gum camphor, pyroxiline, and gum shellac.

311,223.—Filtering paper.—G. H. Billings, E. W. Carter, and D. R. Smith.

The sheets of filtering paper have a fibrous material embedded in the center.

311,257.—Filtering apparatus.—C. W. E. Piefke.

311,258.—Amalgamator.—D. S. Randolph.

311,271.—Disinfecting apparatus.—R. Thayer.

311,287.—Plastic cement mixture for non-conducting coverings for boilers, &c.—D. A. Brown.

The covering consists of infusorial earthy lime and asbestos.

311,294.—Process of surface coating iron.—P. H. Conradson.

The iron is exposed to sulphur vapor in a muffle in an atmosphere of carbon dioxide, at a temperature of 500°-600° C. Sulphuretted hydrogen may be substituted for the sulphur vapor.

311,360.—Process of disinfecting baled rags.—S. W. Parker and H. Blackman.

A perforated nozzle is inserted into the bale, and the disinfectant is cause to pass through the nozzle and out through the perforations thereof.

311,401.—Paint.—W. H. Wilber.

A priming paint composed of liquid asphaltum, rosin, linseed oil, turpentine or naphtha and white lead.

311,403.—Furnace for generating illuminating gas.—S. J. Anthony.

Steam is superheated and decomposed in the lower part of the generator, and the resulting gas is carburetted and fixed in the upper part thereof. Perforated tile or fire brick strainers in the upper part of the furnace serve to heat the gas and to remove from it the lamp black and tarry matter.

311,417.—Method of manufacturing maltose.—L. Cuisinier.

The amylaceous material is reduced to a pulp, and then water containing an infusion of malt is added. The mass is gradually heated to about 80° C. for about 1 hour, and then digested under a pressure of 1-2 atmospheres for about half an hour.

311,441.—Gas generator.—L. Mond.

W R.