which have been obtained in a totally different manner, are so nearly the same as our own. The loss on the Tyne, where open roasters are used, is, I understand, as much as 5 per cent. Dr. Grossmann stated that the quantity of sulphuric acid which is likely to form other sulphates than sodium sulphate with the impurities of the salt is, where Cheshire salt is used, too small to be taken into account. I have not found this to be the case. When this salt is used the salt-cake made from it contains as near as possible sulphuric acid existing as sulphate of lime equal to 1 per cent.

Dr. HURTER: I made some experiments some time since to determine the loss of sulphuric acid in the manufacture of salt-cake. The results I obtained agree, as Mr. Carey has already said, very nearly with Dr. Grossmann's figures. I think it is due to Dr. Grossmann to state that I consider his method superior to mine, in so far as it shows exactly where the loss takes place and what becomes of the sulphuric acid, whereas mine shows only the aggregate loss, and depends, moreover, upon the correctness of tables of specific gravity which, as Dr. Messel has pointed out, are not reliable.

The CHAIRMAN: Most of us have at one time or other made experiments on the loss of sulphuric acid in the manufacture of salt-cake. In my own case it is so long since that it is rather difficult for me to recollect the figures. My own impression is that in practical working the loss is greater than Dr. Grossmann states in his paper. At any rate, the loss will vary in different works according as stronger or weaker salt-cake is made. I may say that I was acquainted with the experiments which Dr. Hurter made some time ago on this subject. As the method which he employed depended upon the correctness of tables of specific gravity, I rather viewed his results with distrust, more so as Dr. Jurisch made some experiments at our Widnes works, employing the same method, which yielded results different from those of Dr. Hurter.

MEETING OF THIS SECTION.

UNIVERSITY COLLEGE, ASHTON STREET, LIVERPOOL.

On 17th May: "On Methods of Dyeing pursued by the Maories of New Zealand," by Mr. J. J. Hummel; also resumed discussion on Mr. Norman Tate's paper, read April 19th.

Communications.

THE CRYSTAL PALACE ELECTRIC EXHIBITION.

BY W. SLINGO, OF THE SOCIETY OF TELEGRAPH ENGINEERS. GREAT as may have been the disappointment of those who expected this exhibition to be finished at Christmas, the beauty of the display, now that it is in a state of completeness, amply compensates for any inconvenience that may have been occasioned by the delay. Apart, furthermore, from all ideas of picturesqueness, the question of utility is brought prominently forward. Nor can it for a moment be doubted that every effort is being made to demonstrate that electrical science has gone far beyond the bounds of curiosity, and is rapidly establishing itself as one of the most potent, yet withal the most governable, of nature's forces placed at our disposal. The exhibits embrace almost every known application of electricity. The most interesting feature is certainly electric lighting, or, perhaps it should be said, incandescent electric lighting. That this is so may be attributed to the comparatively greater maturity attained by the arc light. The Swan, Edison, Maxim, and Lane-Fox are what may be called the typical lamps, and of these the Swan is the simplest and considerably the

cheapest. The various lamps consist of glass bulbs, generally more or less pear-shaped, and ranging from 2in. to 5in. in length. Short pieces of platinum wire fused into the glass are attached to fine filaments of carbonised vegetable matter about 0.01in. in diameter.

In the Swan lamp the filament is made from cotton thread, parchementised by sulphuric acid, and then heated between carbon blocks in the vapour of a hydrocarbon. Almost pure carbon is thus obtained. Edison uses a species of bamboo from Japan, very great efforts having been made by his employees to secure the most suitable substance. The fibre is treated in a similar manner to Swan's thread, one end of the bamboo, however, being made, by a very ingenious device, slightly thicker than the other. It is found that the end of the filament first traversed by the current in flowing through the lamp is gradually diminished, consequently in making one end of the fibre thicker than the other greater durability is secured. The Maxim filament is made from carbonised paper, cut in the shape of the letter M (for Maxim). It is very ingeniously connected to the platinum wires by being clamped between two small platinum washers. The Lane-Fox filament is made from bass broom, mercury contacts being used to connect the platinum wires to the copper wires, which are ultimately connected to the machine. The great difficulty in the way of using carbon in any form as the incandescing substance is its rapid oxidation when made hot in an atmosphere containing oxygen. This was seen forty years ago, and it was suggested that the best, may be the only way, of maintaining the filament would be to enclose it in a vacuum vessel. It was at that time impossible to procure the necessary degree of exhaustion, and it was only about seven years ago that the much-desired object was attained. The strides since made in incandescent lighting are therefore comparatively enormous. The lights at the Palace have many things to recommend them, but there are such slight differences between them, after comparing the bad with the good qualities, that it is very difficult to say what is really the order of merit. The degree of luminosity varies, Swan and Maxim maintaining 25 to 30 candle power, while Edison has two forms, of 8 and 16 candle power respectively. Lane-Fox, however, professes to produce any desired intensity between 10 and 100 candle power. It must not, however, be forgotten that any incandescent lamp can be raised to this degree, the result of which is that the filament becomes less durable. Until within the last few weeks, one might almost say days, it has been considered that a lamp is in good condition if it will last for a period equal to 700 to 1,000 hours' continuous burning. Mr. Swan, however, asserted before the Royal Institution, on the 10th instant, that his lamps could be relied upon to give a good light for 1,200 hours. This being the case, we may hope soon to hear of still greater durability. Indeed, there is no reason why, with patient endeavour, the duration of the filament should not be trebled, or even quadrupled. A fortnight since it was the general feeling that Edison had far outstripped his competitors for public favour, but while he has not advanced beyond the position he had then attained, others have made very great and rapid progress, and it can scarcely be denied that the Swan light in Messrs. Jacob's Furniture Court is now viewed with great favour by experts, the purity of its colour and the softness of its glow bearing a strong contrast to the yellower light of Edison, rendered more yellow by the gorgeous brasswork with which it is surrounded. The Maxim light, too, is very good, and, viewed apart from the arc-lights in its vicinity, is of great purity in colour, while the evenness of luminosity in the various lamps is very noticeable. Nothing can be prettier than the

Lane-Fox display, with the patent opalised globes, in the Alhambra Court, but here much of its effect is due to the beauty of the situation.

Arc lighting is well represented, and effectually turns night into day. The light which promises to be the most economical, and at the same time efficient, is the Brush, which illuminates the Tropical Department, and from the Costume Court along the corridor to the Brighton Company's station, the latter display being maintained by the Hammon Electric Light Company. The great feature in the way of arc lighting is the tremendous Brush light, intended for illuminating unusually large areas, having a computed intensity of 150,000 candle power. It is, however, not to be compared with the other lights of the same type for steadiness, etc., there generally being a flame which is occasionally 10 in. or even 12 in. long. The carbon rods in this lamp are 2½ in. in diameter.

The Siemens light was rather late in the field, but, judging from the result, the little delay has been highly beneficial. A large bronze steel electrolier (or chandelier) is suspended over the fountain, the lamps being extremely steady and of great uniformity. A powerful light, placed high up in the nave, and a number of smaller ones in various positions, call forth unanimous and hearty congratulations from his co-workers. It is very pleasant to find the name of Siemens as much to the fore in electrician's lighting.

The Pilsen, Hawkes, Gerard, Crompton, Gravier, and Weston lights are all very creditable exhibits, noted alike for steadiness and luminosity.

A strenuous attempt is being made to push the semi-incandescent lamps once more to the front, but their relative cost is too great. In this category we may class the Jablochkoff candle, in which the current passes between two small carbon rods, separated by plaster-of-paris, giving a fair light, but not sufficient for the force expended. The Werdemann type is represented by the Joel lamp, which is now burning very steadily in the Pompeian House, but is scarcely comparable to the other lights. In this lamp there is a large horizontal block of carbon, and a thick rod of the same substance presses against the under side, so that the current in passing makes the upper part of the rod incandescent, a small arc at the same time playing between it and the nearest parts of the carbon block.

Next to electric lighting, the telephone may be said to rank in interest, and the exchange system is well illustrated. A central office is erected in the nave, and telephones are placed in various parts of the Palace. Besides this, there is the Telephone Concert Room. Two large rooms are fitted up in the Eastern Gallery, and contain several telephones connected with the Concert Room, so that those who desire can quietly enjoy telephonic music, which is tolerably faithfully rendered.

Telegraphy stands out well, but there is little new, the chief interest centering in the historic and "curiosity" collections of the Post Office and various companies.

It follows that the immense quantity of electricity required in the various systems of lighting necessitates a large amount of motive power. This generally is supplied by the steam engines, and the contest for supremacy in steady and effective working is very keen—so close, indeed, that it is impossible, with the data at present available, to assign to any particular engine the first place. Those who are most intimately associated with the various systems of lighting are unable to do more than express an opinion that one may be a little steadier than another. Nevertheless, it must not be imagined that the question of the engine is secondary, for the slightest variation in the pressure of steam, and consequently

in the speed with which the armature of the dynamo machines revolve, must result in a corresponding fluctuation of the current, and necessarily of the light. Very great efforts have been made to get engines sensitively governed, and the result is almost perfection. The greatest difficulty with which electricians have now to contend is impurity of the carbons. Anent these it may be mentioned that some kinds are encased in a more or less thick coating of electro-deposited copper, the object being to regulate to some extent the consumption of the carbon. It, however, frequently happens that a quantity of the copper melts under the great heat, and falls to the bottom of the containing glass globe, which is often fractured. The Brush and Edison systems are worked by Robey engines, and the Weston and Maxim systems by Mansone's. Hodson's rotary engine is being extensively used, and at present gives fair results. Little requires to be said on what must ultimately be the effect of driving direct off the engine at a speed of 1,000 to 1,500 revolutions per minute. Gas engines may be said to be on their trial. Those who use them appear satisfied with the results so far attained. The great question left for decision is their steadiness, or, rather, even running.

Too little attention appears to have been given to the amount of power required to produce the electric light. Generally speaking, an arc light estimated at 2,000 candle power is maintained by the expenditure of one horse power (that is, presuming several lights are going), which also generally supports about 10 incandescent lamps, each of about 20 candle power. It will thus be seen that while a little over 200 candle power is obtained by incandescent lighting, nearly ten times that amount of light is produced on the arc principle. It therefore follows that, admitting the inestimable value of incandescent lighting for domestic and general indoor purposes, the arc is more economical for illuminating large spaces. Mr. Swan has taken great pains, however, to demonstrate that the smaller light is still considerably cheaper than gas.

Electro-chemistry is again becoming a very prominent applied industry, and nothing can be conceived more beautiful than the artistic display of Messrs. Elkington and Co., illuminated as their room is by fifty pretty Swan lights. The Herculaneum Table is simply superb, and of itself is worth a visit to Sydenham to see. Outside, this firm displays the interesting processes of electro-typing, plating, and gilding in solutions of sulphate of copper, cyanide of silver, and cyanide of gold respectively. They use an Otto gas engine, driving a Wyldo dynamo-electric machine, wound quantitatively—that is, with thick wire, the baths being all in parallel circuit.

Mr. Elmore exhibits a fine collection, including a dynamo machine, which separates, from the common metal, one ton of the purest possible refined copper (for conductivity purposes) per day. There are also a number of illustrations of electrotyping. The great attraction, perhaps, is the hitherto unattainable deposition of very thin coatings of pure tin on iron, as well as of zinc, copper, and nickel. The tin is deposited from a pyrophosphate solution, and nickel from a solution of the double sulphate of nickel and ammonia. The feature in these deposits is their thinness, combined with extreme regularity. A specimen is exhibited of tin deposited on a cast-iron ornament, the appearance being exactly like that of dull silver. This, when scrub-brushed, is as brilliant as the ordinary tinned work.

Lastly, reference must be made to the exhibits of Dr. Gladstone and Mr. Tribe, of the action and effects of their now historic copper-zinc couple. Without doubt there is a great future for research work in this field.

Notes of the Month.

ROYAL COMMISSION ON TECHNICAL INSTRUCTION.—Professor Roscoe, Mr. Woodall, M.P., Mr. Ph. Magnus, and Mr. Swire Smith, with the Secretary, Mr. G. R. Redgrave, have left England on an extended tour in Alsace, Switzerland, and Germany, for the purpose of inspecting the various descriptions of Trade Schools and Science Schools, as well as of visiting the largest centres of manufacturing industry in those countries. The Chairman (Mr. B. Samuelson, M.P.) and Mr. Slagg, M.P., are detained at home at present by their Parliamentary duties. They will, however, join the other Commissioners as soon as possible.

THE LATEST ELECTRIC LAMP.—Mr. Edison has recently overcome the unsteadiness which forms so great a drawback to the arc light, by causing the upper carbon to revolve rapidly. He first made the experiment with a hand wheel, and this proving successful, he fitted into his lamp a small electro-motor, which gave the "candle" 3000 revolutions per minute and secured perfect steadiness. The same current which supplies the light and forms the arc turns the electro-magnet. This lamp has not yet appeared in England.—A.R.D.

COST OF ELECTRIC LIGHTING.—In a lecture at the Royal Institution, on March 10, Mr. J. W. Swan dealt with the mode of lighting known as the incandescent. From the fact that a well-made lamp was not destroyed by being continuously heated to a fairly high degree of incandescence for 1,200 hours, he argued the possibility of making this piece of apparatus cheap and durable. With regard to the production of light, 1 cwt. of coal, taking by-products into consideration, will yield in gas the equivalent of 3,000 candles for one hour. However, 1 cwt. of coal will give the steam force necessary to generate by means of the incandescent lamp the equivalent of 7,500 candles for an hour, even after allowing 25 per cent. for waste, etc. He thought the expense of renewing lamps counterbalanced by cost of burners, globes, chimneys, with injury to furniture, etc., and the same might be said of the plant required for the generation of the electricity. The difficult question of distribution might be answered if it were found practicable and safe to distribute electricity of high tension, but this would involve a comparatively large number of stations. He had been told by Sir William Thomson that the cost of laying wires in his house was less than that of plumbing with gas. Mr. Swan also mentioned the curious fact that excellent carbon wicks were to be got from bamboo or from cotton treated with sulphuric acid.—It is interesting to compare with the above the opinions expressed at a discussion before the Society of Engineers, on March 20. From some recent experiments, one gentleman gave the electric light the advantage over gas in the ratio of 64 to 10, the arc light being used, and gas taken at 5s. per 1,000. Another speaker believed that the incandescent lamp was half as cheap again as gas at the above rate, which he did not think was a fair one, as it could be got for 3s. per 1,000, while Mr. R. P. Spice, C.E., gave as the calculation of a great New York electrician that the incandescent costs seven times as much as the arc light, which, in turn, is three times as dear as gas at 3s. per 1,000. Evidently the exact cost of electric lighting is not quite settled yet. A.R.D.

PRESERVATION OF BRONZE MONUMENTS AND STATUES.—(J. W. Brühl. Dingler, 243 251.)—It was found that the blackening of bronzes recently erected in towns was not due to the formation of sulphide of copper, but depended on coal dust, etc. This coating may be easily removed by washing with a solution of ammonium carbonate. The irregular green film which is formed by the action of ammonium carbonate on the copper is removed by washing with weak sulphuric acid.—D.B.

INDIGO (*Report of Nestle, Andreac, and Co., London, Jan. 10*).—The following is the present position of the indigo market: Stock on January 1, 8,538 cases (against 6,922 in 1881). Expected arrivals from Calcutta, 10,000 (14,036). From Madras, 10,000 (8,669). Total, 20,538, against 29,627 last year. Estimated deliveries, 21,000 against 21,089. Probable stock on Jan. 1, 1883, 7,538 cases against 8,538 in 1882. The Madras import may exceed our estimate, as the crop is reported to be a good one. The position this year is very similar to that in 1881. Prices, however, are somewhat higher, new imports fetching 9d. and 1s. more than last year. Total import in 1881, 22,705 cases against 14,698 in 1880. Total deliveries, 21,089 against 22,543 in 1880. Stock on Dec. 31, 1881, 8,538 cases against 6,922 in 1880.—O.N.W.

THE ELECTRIC LIGHT IN FRENCH LIGHTHOUSES.—On March 6, the French Chamber sanctioned the grant of 8,000,000f. for the reorganisation of the lighthouses. M. Allard, the Inspector-General, proposes a sufficient number of signs and combinations to distinguish all the chief houses from one another. An important alteration is that the reading will depend upon the number of flashes with a red flash or period of obscurity intervening, instead of upon the number of seconds between each flash. The mean intensity of the lights is taken at 1,250,000 candles, and M. Allard promises as good results as with oil, and for a longer period of the year on the Channel and Atlantic coast, with yet greater efficiency on the Mediterranean. The electric light is to be provided in 46 lighthouses, at an average cost of 125,000f., and, in addition to this, steam foghorns are to be erected at about 20, at an average cost of 50,000f.—A.R.D.

Journal and Patent Literature.

GENERAL PLANT, APPARATUS, AND MACHINERY.

A Direct-action Pulsometer. Journal d. Fab. d. Sucre 10, 1882.

THE direct-acting pulsometer of C. Ulrich, constructed by Messrs. Kötting Brothers, is based on a different principle from the ordinary American pulsometer. Whilst in the latter the difference of temperature necessary to its action is produced indirectly by a vacuum made in a space accessible to the fresh steam, the same result is produced in the direct-acting pulsometer by the steam coming straight from the boiler into special packets. The result is, that the steam is condensed in a closed space, and the difference of temperature necessary is only equal to that which exists between the steam at the high pressure and the steam at a slightly lower pressure. In the old pulsometer this difference is equal to that between the temperature of the high pressure steam and cold water. It is found in practice that the old pulsometer gives 42 pulsations per minute, and heats the water 22°C. for each metre that it is raised, whilst the same pul-

someter, when converted into a direct-acting apparatus, gives 75 pulsations per minute, and does not heat the water more than 12°C . for each metre of elevation. The advantages of the new apparatus are the following: Certain and quiet in action, with absence of shocks, and requires no attention; considerable duty, which may be increased by varying the steam, and is only slightly diminished for great elevations; saving of 50 per cent. of steam. The installation costs scarcely one quarter of that of an ordinary pump, and liquids may be raised to any height with a corresponding pressure of steam.—A.W.

Fletcher's Anemometer for Sulphuric Acid Works and Chimneys of all kinds. Prof. Lange. Chem. Zeit. vi., 239.

THE author has tried the most recent form of the ether-anemometer constructed by Fletcher, and states that the two microscopes by which the levels are more exactly observed render the manipulation with the instrument laborious, and they can be dispensed with. With this modification he regards the instrument as the best anemometer known, not only in the testing of acid gases but for all similar purposes.—E.B.S.

Improvements in Pumps with Hydraulic Piston-rods. C. Blasendorff. Ger. Pat. 16968, March, 1891.

IN order to raise water from great depths, with the real working pump A, assistant pumps B, with differential buckets, are combined. With the first the suck-valve is for this purpose left out. On raising the bucket *i*, the now burdened differential buckets *b* sink, and if the cross-section of the bucket *a* be called a^2 , and that of *b* b^2 , and the lift of *a* and *b* called *y*, then a quantity of

water b^2y will be drawn through the pipe *d*. If the bucket *i* be pushed down, then the buckets *b* and *a* rise, whereby at *f* water is drawn up and a quantity of water a^2y is driven through *m*, since by the rising of *b* and *a* an increase of space of $(b^2-a^2)y$ takes place. This arrangement is also applicable in the case of double-working pumps.—W.S.

Condensing and Distilling Apparatus. T. J. Rayner, London. Eng. Pat. 205, Jan. 15, 1891.

AN apparatus constructed by winding two thicknesses of sheet metal in volute form so as to present a continuous inner volute space for the liquid or vapour to be distilled or condensed, and a continuous inner volute outer space between the successive convolutions for the passage of the cooling or heating liquors.—W.P.T.

Improvements in Apparatus for Rectifying Alcohol. D. Fr. Savalle. Ger. Pat. 16909, May, 1891.

IN order to separate the alcohol flowing back out of the condenser according to its value and strength, it is compelled to traverse a very long and narrow course. This

FIG. 1.

FIG. 2.

is attained by furnishing the compartments of the rectifier with projections, which compel the alcohol on the divisions of the compartments to make a longer journey (see Fig. 1), or for the same object the perforated divisions are furnished with plugs. The number of the divisions or floors is increased to at least 40, so that the alcohol must now pass through a considerably longer course than hitherto.—W.S.

Soap-planing Machine. E. Rost, Dresden. Ger. Pat. 14184, Aug. 1890.

ON either end of the machine a wire and a knife frame are fixed. In order to stop, after each slide, the double-sided sliding partition which moves the soap bars alternately to the right and left, three loose wheels are fixed on the shafting. Each of the two external wheels is connected with a pinion, in such manner that one of them drives another wheel directly, whereas the other acts on an interposed pinion so as to move the wheel, which it works, in the opposite direction. The axle of the latter wheel bears a toothed wheel, which works the toothed bar of the sliding arrangement. At the termin-

tion of a slide two tappets and a fork, which are connected with the toothed bar, shove the strap from the external on to the middle wheel, thus stopping the machine until the workman moves the strap back on the right or left wheel. In order to be able to use the same sliding partition for different positions of the wire on the cutting frame, the movable pieces of wood B of the back piece A (Fig. 1) have tacks C, by means of which they can be put into the slots D, which are placed close together. On the top the pieces B are covered with sheets, with which they can be put into grooves F of the top end of the wall. Or the pieces B (Fig. 2) reach by means of the hook H over a rail I on to A, and are fixed to A by tightening the screw K.—J.G.

Broom and Scoop Mechanism for Evaporating Pans. Carl. F. W. Schramm, Brooklyn, N. Y. U.S. Pat. 255035, March 14, 1892.

A SHAFT runs in a longitudinal direction with and is supported above the evaporating pan. The transverse section of the evaporating pan is the shape of a trough recessed on a segmental line, the centre of the circle of which segmental line is the centre of the shaft. A series of telescopic arms radiating from either side of this shaft

carries respectively a scraper, in the form of a scoop, and a brush. A gutter is arranged along one side of the evaporating pan. As the shaft revolves, the brush loosens the crystals, etc., on the side of the pan, and the scraper then entering scoops them up, and tilts them into the side trough through the intermediation of a cam and springs. The radiating arms are telescopic, so that the brush and scoop can be adjusted to the sides of the pan; the scoop is also perforated to permit of drainage.

W. P. T.

Apparatus for Rectifying Alcohol, and Separating Mixed Liquids under Diminished Pressure. Knoul Pictet. Ger. Pat. 10512, Dec., 1890.

THE liquid having been introduced into A is heated to 30 to 40°C. by means of a current of steam, which passes through a worm. The pump E is then set working to exhaust the apparatus of air, the final expulsion of which is brought about by the boiling which soon commences. The pump, now drawing only alcohol and water vapour, is cut off by closing the cock G, or the lower portion of its cylinder is thrown into direct connection with A by means of the three-way cock K, in which case the vapour is returned to A, and assists in the ebullition of its liquid contents. When the manometer F is constant, the liquid in the condenser C is cooled. For this purpose sulphurous

acid may be employed, being introduced into the inner arrangement of tube C, and evaporated by means of a pump, the vapour being condensed and returned by means of an arrangement not represented in the drawing. The liquid condensed in C flows out at L, and its further passage is controlled by the cocks M and N; N establishing connection with the column of plates B, M with the reservoir D. These cocks are opened simultaneously and in such a way as approximately to bisect the flow of condensed liquid. This arrangement causes progressive concentration, and after a certain time the liquid collecting in D will be found to contain 96 to 97 per cent. alcohol (the original liquid being a mixture of alcohol and water). To accelerate the distillation, a wheel P, carrying floats, is kept in rotation in A.—C. F. C.

FUEL AND LIGHT.

Apparatus for Manufacturing Illuminating Gas. W. P. Thompson, Liverpool and London. Communicated by H. T. Smith, Sydney, and H. U. Alcock, Melbourne.

Air is pumped through a cylinder containing fibrous material and easily evaporated hydrocarbon to a gas-motor formed of a drum with elastic cover. The principal novelty consists in an arrangement of valves by which non-carburetted air can be added, and the amount of carburetted air entering adjusted, so that the state of carburation can be altered and the light-giving qualities regulated instantly and at pleasure.—W. P. T.

Composition of Coal. O. Helm. Ber. xv., 643.

THE author shows that not all the sulphur contained in coal is there in form of pyrites, but that some exists in another form, probably combined with carbon.—F. H.

On the Preparation of Pure Carbon for Electric Lighting.

M. Jacquelin. Compt. Rend. xciv., 13, Mar. 17, 1882.

THE author describes three methods of purifying carbon. (1) Treatment with dry chlorine at a high temperature. In this way silica, alumina, magnesia, alkalis and metallic oxides are removed as volatile chlorides, and the combined hydrogen forms hydrochloric acid. The carbon should be cut into sticks before submitting to this process. The vacancies left in the carbon after treatment with chlorine may be filled up, and the mass made compact by heating in a closed vessel with some hydrocarbon such as heavy coal oil. In the course of a few hours a sufficient deposit of carbon will have taken place. (2) The carbon may be treated in an iron vessel with fused caustic soda. In this way aluminates and silicates are formed, and may be removed by washing. Dilute hydrochloric acid is next applied to dissolve oxide of iron and earthy bases, and the carbon is finally washed with distilled water. (3) By immersion for 24 hours in hydrofluoric acid diluted with twice its weight of water, carbon may be efficiently purified. The danger accompanying the use of hydrofluoric acid is an objection to this method. These three processes are applicable to gas retort carbon or to Russian graphite. The author has also prepared pure graphitoid carbon from heavy hydrocarbons. It is of excellent quality, but he is unable to state its relative cost. He notes that natural graphite from Siberia gives twice as bright a light when purified as when used in its natural state.—A. S.

Apparatus for Automatic Regulation of the Heating of Hydrocarbon Substances in so-called Albu-carbon Gas Lamps. L. Fredholm. Germ. Pat. 10030, April, 1881.

BY the heat developed in the naphthalene reservoir A the substance shut up in the tube N expands and presses the flat and thin cover of the case O upwards. In consequence also, the set screw M resting medially or immediately on the cover of the case O is raised, and thereby the ring F (combined in the system by the holder L), which is set around the naphthalene reservoir. Thus the ring revolves about the fulcrum of the support H, and that projecting portion of it which forms the heating

plate G is raised up off the under plate I, which is attached to the reservoir A. The immediate contact of the plate G with the naphthalene reservoir A ceases, and thus the heating plate G no longer conducts its heat to the reservoir. The set screw M serves for regulating the extent of this raising of the heating plate.—W. S.

Warming Apparatus for Carburetting Air or other Gases in the Manufacture of Illuminating Gas. E. Richter and Triebel. Ger. Pat. 10873, July, 1881.

THE gas or otherwise air-conducting pipe of the carburetor is surrounded by a closed cylinder a (see figure), which communicates with an outer boiler C by the tube b¹, b²,

The cylinder tubes and boiler are filled by the funnel *d*. The boiler is heated by the lamp *e*. With the warming of the water in *C* the circulation of the same commences, so that continually the warmer layers displace the colder to the boiler, and these becoming heated again here travel once more round, and thus the circulation is maintained. In order that the gasoline (petroleum

spirit) passing downwards by the different divisional partitions of the evaporator may come into direct contact with the inner cylinder *a*, the latter is surrounded at certain intervals with a funnel closed below, which the gasoline (and likewise the air passing in the opposite direction) has to pass. The air thus saturated with inflammable vapours forms the gas.—W. S.

Improvements in Ovens for Charring Wood, Peat, and Lignite. By O. Graf Zur Lippe. Ger. Pat. 16961, June, 1881.

This invention purposes the enriching in combustible-matter combustibles containing much water, by expelling the water as well as a part of the ash by means of superheated steam. From the steam boiler *b*, combined with a superheater, the superheated steam passes through

openings *g* in the roof of the coking space *R*. Here the combustible matter to be improved is brought in wagons *w*, constructed of open trelliswork, so as to allow free access to the steam. The gases passing from the combustibles, together with the steam, find exit through the channel *h* to the chimney *S*.—W. S.

Fire-Extinguishing Compound. Michael Mather, Jersey City. U. S. Pat. 254500, March 7, 1882.

EIGHT parts by weight of soda, 4 parts alum, 3 of borax, 1 of potash, and 24 of silicate of soda solution are mixed together (by soda and potash he probably means the carbonates). One and a half pound of this is added to each gallon of water when required for use. The object is to cover everything with a waterproof film or deposit.—W. P. T.

DESTRUCTIVE DISTILLATION AND PRODUCTS.

Purification of Naphthalene. By Prof. G. Lunge.

The crude naphthalene is mostly obtained from the coal-tar oil that remains after treatment with soda lye for the purpose of separating the phenol. In such oils the treatment with acid can be begun at once, but naphthalene

which has been obtained directly from the tar oil by crystallising it out should first be treated with alkalis. The crude naphthalene is melted and a certain quantity of sulphuric acid added to it. On a large scale 5 to 10 per cent. of acid, of 60° B., is sufficient; but if acid of 60° is used of course proportionately more is required. When the liquid naphthalene and acid have been well mixed and stirred, 5 per cent. of finely-ground pyrolusite (dioxide of manganese), or, better still, the regenerated oxide of manganese (from the Weldon process) is gradually added and the mixture heated fifteen or twenty minutes on a water bath. It is then allowed to cool and the cake of naphthalene is washed several times with water, a little soda is added to the wash water, and then it is again washed in clean water. The naphthalene thus prepared is finally distilled. When purified in this way it has kept perfectly white, according to Lunge, for eight or nine months. In America, where the water gas process is so extensively employed, a comparatively pure naphthalene is obtained as a waste product.

On the Products of the Distillation of Colophony. M. A. Renard. Comptes Rendus xciv. p. 11., March 13, 1882.

By the distillation of colophony, three products are obtained, a terebenthene ($C_{10}H_{16}$) and two isomeric hydrocarbons ($C_{10}H_{18}$), one of which is a higher homologue of heptylene, viz., decene and decylene. The results show that there exist in resins two series of hydrocarbons of the formula C_nH_{2n-2} , one acted upon by sulphuric acid, the other unattacked by that acid.—A. S.

Solid Hydrocarbons in Petroleum. Oil and Drug News. March 21st, 1882.

THALLENE is one of the solid hydrocarbons from petroleum, and we are indebted to Professor Henry Morton for its discovery and separation in a pure state. His attention was drawn to a resin-coloured tarry fluid among the last products of the distillation of petroleum. When the residues left in the distillation of petroleum for the manufacture of illuminating oils are redistilled to obtain lubricating oils and paraffin, there passes over near the end of the operation, and when the still is at the bottom almost or even quite red hot, a thick resinous matter of a dark honey or light sepia colour, which is used as a lubricant for the necks of "rolls" in iron-mills. This is the material from which the body is extracted by the following process: The tarry matter above described is mixed with about its own volume of petroleum spirit, and is thrown on a stout filter, where it is well washed with the same solvent. This leaves a dark olive-green, flaky powder, constituting about 3 per cent. of the original mass, and very similar in appearance to crude commercial anthracene. This is now washed with alcohol, and even digested in this liquid, by which means a brown material, whose solution in alcohol has a decided fluorescence, is removed. The substance is then dissolved in hot benzene (coal-tar product) and filtered in a jacketed funnel, by which operation a quantity of black powder is removed, and allowed to crystallise on cooling. It then deposits in very small acicular crystals, collecting in tufts, and the purification is carried on by re-solution and crystallisation from fresh benzene. The substance thus obtained has the colour of potassium chromate. The following table of solubilities will indicate the motive for the above treatment:—

Petroleum Spirit, hot (71° C.),	dissolves 1 part in	1.55
cold (21° C.),	"	2.00
Alcohol, hot (71° C.),	"	4.172
cold (21° C.),	"	10.725
Benzene, hot (70° C.),	"	152
cold (21° C.),	"	65

This substance dissolves in turpentine pretty freely, and yet more so in carbon bisulphide and chloroform. In ether and olive oil, and carbon tetrachloride, it is hardly as soluble as in petroleum spirit. Four analyses show the composition of the purified body to have about the same percentage composition as anthracene. A pretty extended study of its physical and chemical properties, however, shows that it is quite a different substance.

While anthracene combines with about twice its weight of picric acid to form the picrate, which crystallises in long needles of a bright red colour, thallene requires fully four times its weight of picric acid to saturate it. On cooling from hot solution, a granular mass of minute crystals is formed having a rich orange-red colour. Examined under the microscope, these crystals are seen to be short prisms with well-defined pyramidal terminations. Sulphuric acid of density 60° B., which rapidly blackens anthracene even at the ordinary temperature, gives thallene a rich grass-green colour, which remains unchanged even after standing for weeks and exposure to a temperature of 60° C. The picric acid compounds, both of anthracene and thallene, show no fluorescence, so that this gives us a convenient method of determining the point of saturation. A little solid thallene, placed between slips of mica in Becquerel's phosphoroscope, showed a bright illumination, with a rate of rotation corresponding to a duration of about $\frac{1}{3}$ of a second for the fluorescent action, but the benzene solution showed no illumination at the highest velocity to which the apparatus could be urged. By the exposure of a hot benzene solution of thallene to intense sunlight, which is best done by bringing it near the focus of a large lens and allowing it to cool, in a very short time its character is changed, and now almost white crystals are deposited, differing from thallene in its fluorescent property, and exhibiting different absorption bands; also the amount of picric acid required to saturate is different. Professor Morton has called this substance petroleuene.

Some Conversion Products of Quinoline. G. Kürner. *Berichte der Deutsch. Chem. Gesellschaft* xv., 528.

THE author obtains two bases by distilling a mixture of 1 molecule of quinoline, 1 molecule of methyl iodide with caustic potash. One of these bases ($C_{12}H_{11}N$) boils at 193°, the other at 240°. The first is dimethylanilin, the second is heavier than water, and seems to be a lepidine oxidation of the dimethylanilin, an acid was obtained but not further examined.—F. H.

Investigation of Caucasian Petroleum. W. Markownikow and W. Ogolihin. *Journ. Russ. Phys. Chem. Soc.*, vol. i., 36, 1882.

THE distillates of the Caucasian petroleum which come over at from 150° to 300° under the ordinary pressure, and from 210° to 330° under a pressure of 20mm., after being freed from compounds containing oxygen, have, as shown in a former paper (*Journ. Russ. Phys. Soc.* 1881, i., 179), a composition nearly approaching the formula $C_{11}H_{12}$. The composition of the mixture of the hydrocarbons is however expressed by the general formula, $C_{11}H_{12}$, as soon as the higher boiling ones have been separated. The quantity of hydrocarbons which combine with sulphuric acid at the ordinary temperature varies from 10 per cent. to 20 per cent., according to their boiling point. The fractions distilling between 5° and 5°, or 10° and 10°, gave a mixture of sulpho-acids which could only be separated into its constituents with difficulty. A sulpho-salt of the formula $C_{11}H_{12}SO_3Na + 4H_2O$, and the salt of the exsulphonic acid were obtained from the fraction distilling at 180° to 190°, while from that boiling at 190° to 200° two isomeric sulpho-acids of the hydrocarbon $C_{13}H_{14}$ were separated. Besides a mixture of two sulpho-acids, from which a hydrocarbon $C_{11}H_{14}$ was obtained, the hydrocarbons boiling between 240° and 250° gave the sulpho-salts $C_{12}H_{12}SO_3Na + H_2O$ and $C_{12}H_{12}(SO_3Na)_2 + 3H_2O$. The fraction obtained at from 240° to 250°, on treatment with sulphuric acid, was only partly dissolved, a mixture of two hydrocarbons being left behind, which, judging from the vapour density, had the formulae $C_{11}H_{12}$ and $C_{13}H_{14}$. In the opinion of the authors, that part of the petroleum which boils between 180° and 200° contains hydrocarbons of the formula $C_{11}H_{12}$, and a small quantity of the hydrocarbon $C_{11}H_{14}$. Besides these hydrocarbons metamethylpropylbenzol has been isolated from it, and it contains most likely also dulon. The portion boiling at from 240° to 250° is believed to consist of an isomeric propylmethylalin

($C_{13}H_{14}$) and the hydrocarbons $C_{12}H_{14}$, $C_{11}H_{16}$, and $C_{13}H_{18}$. These facts account sufficiently for the inconsistency of the boiling point of the petroleum. The aromatic hydrocarbons are supposed to be contained as such in the crude petroleum. The great facility with which the gaseous hydrocarbons dissolve in the petroleum, and the obstinacy with which they are retained, even on heating, have already been made mention of by the authors.—F. M.

Occurrence of Cuproic Acid in Resin Oil. W. Kelbe and C. Warth. *Chem. Zeit.* vi., 221.

THE mixture of acids extracted from oil of resin by sodium hydrate was dissolved in alcohol and saturated with hydrochloric acid gas. The ethers thus prepared were separated by fractional distillation; that portion which boiled at 150° to 155° was decomposed by hydrochloric acid, and the free acid was distilled off with steam. The calcium salt was then prepared and purified, and was shown to be the salt of methylpropylacetic acid.—E. B. S.

Dimethylnaphthalene. A. Emmert and Fr. Reingruber. *Chem. Zeit.* vi., 243.

AFTER having isolated from the higher boiling portions of tar-oil a methyl-naphthalene, the authors have recently investigated that fraction which boils from 264° to 266° and which consists of several isomeric dimethylnaphthalenes. As these cannot be separated by fractionated distillation, they were acted upon by fuming sulphuric acid, and gave several sulphonic acids. The barium salts of the monosulphonic acids are more difficultly soluble than the barium salts of the disulphonic acids, which are also formed.—E. B. S.

A New Manufacture from Coal Gas and from Petroleum. Pat. No. 252478, for the manufacture of dinitrobenzene.

THIS patent is receiving much attention in France and Germany. Hitherto benzols for the manufacture of nitrobenzene for colour-making have been procurable only as a distillate of coal tar, while it is now found that the gas itself contains nine times as much benzene as the tar from a given quantity of coal. The patentee proposes, first, the destructive distillation of coal and then collecting the benzene as a dinitro product; the process has been worked out from the laboratory to a small experimental plant of three retorts, and is now being worked at the Beekton Gas Works, London. As much as 6,000 pounds of the dinitro have been obtained from 100 tons of coal. It is found that the dinitro can be obtained from petroleum residue. This will make this process of value in America, as heretofore benzols have not been produced on any large scale, and it is interesting to know that products of the benzene series will shortly be produced from petroleum. The patent is in the hands of Messrs. Lister and Bigg, of London. [To remove the benzene vapours from coal gas would be to rob the gas of a chief illuminating constituent. The gas would then need re-carburising, which could be effected with petroleum spirit, or with shale spirit, which latter contains a certain quantity of benzene and toluene, and that cannot be extracted to profit.—E.D.]

Pressing Paraffin Seals. Lawrence Hislop, Chester. Eng. Pat. 3511, August 12, 1881.

HE presses the paraffin seals while immersed in water heated almost to the melting point of the seals. By so doing, he states, the impurities are more perfectly removed.—W. P. T.

Manufacture of Dinitrobenzene from Gas obtained by Distillation of Coal. J. A. Kendal, London. U.S. Pat. 252473, January 17, 1882.

GAS, rich in benzene, is passed through nitric acid and sulphuric acid, the latter being in excess.—W. P. T.

Automatic Discharging Apparatus for Bone-black Kilns. Auguste A. Goubert, Jersey City, N.J. U.S. Pat. 254474, March 7, 1882.

THE apparatus consists of wings, or arms, revolving upon a disc at the bottom of the discharge pipes from bone-black kilns, which act as rotating wedges to force the charcoal over the edge of the disc, and so keep up a continuous discharge.—W. P. T.

Apparatus for Distilling Petroleum. Charles J. Tagliabue, Brooklyn, N.Y. U.S. Pat. 254176, February 28, 1882.

THE oil is heated in a tank to 500° in a bath of whale oil. The heated oil is drawn out in small jets, which are atomised by steam jets in the well-known manner. This completes the vaporisation. The vapour is drawn from the top of the chamber by atomising with a cold-water jet. This condenses the vapour, which falls with the water as distilled oil. The advantages claimed by this process are that the residual hydrocarbons are not caked, and that the distilled oil has no time to oxidise, being cooled too quickly.—W. P. T.

Process and Apparatus for Distilling Oil. John M. Martin, Oil City, Pa. U.S. Pat. 254990, March 14, 1882.

THE oil is distilled in a still having a series of goose-neck pipes passing into a primary separator surrounded by a steam coil. Here the distillate is separated into oil and vapour. The vapour passes by pipes through a condenser into a secondary separator within the first, and heated by the primary hot vapour surrounding it. The escape pipe from the secondary separator leads into a drum, and the steam pipe placed within the primary separator also opens with a rose end into the said drum, the steam, by this time highly superheated, drives off any light vapours from the distillate in the drum, before said distillate enters a large condenser.—W. P. T.

Improvements in Gas-retort Furnaces. By A. Hegener. Ger. Pat. 16773, May, 1881.

THE receiver A is so placed beneath the lowest series of retorts C that the products of distillation, gaseous as well as liquids, descend. The tarry matters fall directly into A, and do not come in contact with the gas; the connection of each retort is established by separate egress pipes, E, the

luted portion of which lies outside the receiver. The tar is carried off from the bottom of A through the tubes F, collects in G, and rises in H to the level of the liquid in A, the liquids in both being maintained under the same conditions of pressure by means of the connecting tube K. From H the tar is conducted to a reservoir.—C. F. C.

Carbonising Bones. W. L. Wise, London (communicated by Messrs. Pilon Freres et Cie., Paris). Eng. Pat. 3232, July 23, 1881.

THE bones are filled into a series of retorts set in a furnace chamber. These retorts have prolongations as cooling chambers below. The bones are fed in intermittently at top, and taken out in a similar manner from a sliding box at the bottom of each cooling chamber.—W. P. T.

Extracting, Refining, and Hardening Paraffin. Heinrich Ughely, Vienna (communicated to Tietz and Co., London). Eng. Pat. 3705, August 25, 1881.

THE crude scales are mixed with ethyl, methyl, or amyl alcohol and petroleum (benzine or naphtha), and heated to aid solution. The paraffin crystallises out of this solution, and is squeezed in a filter press. The heavy mineral oils are separated from the remaining liquid by distillation.—W. P. T.

COLOURS, DYES, PAINTS, AND VARNISHES.

Adulterated Cochineal.

A NEW adulterant for cochineal, and one exceedingly difficult of detection, has been found and already put to use. Messrs. D. F. Tiemann and Co. recently received an invoice of black Teneriffe cochineal, which, though apparently of fine quality, was found on investigation to contain 12½ per cent. of black iron sand. So skilfully was the adulteration accomplished that it was only discovered in the precipitation, made in the initiatory process in the manufacture of carmine.

Dyestuff from the Cotton Plant (*Gossypium herbaceum*). Leipz. Farb. und Zeugdr. Zeitg. (1) 1882, p. 22.

W. C. STAHL has observed that by extraction of the bark of the root of the cotton plant with alcohol of 0·84 sp. grav., a reddish-brown solution may be obtained. By distilling off the alcohol the dyestuff remains as a resinous mass, weighing 8 per cent. of the bark employed. It is soluble in caustic alkalis (with a green colouration), alcohol, chloroform, and benzene.—O. N. W.

Novelties in Dyes. Deutsche Färber Zeitung vi., March 15, 1882.

THE manufacture of artificial indigo has not yet fully realised the hopes of those who have engaged in it. *Alizarin Blue*, which was looked upon as its most dangerous rival, is still in limited demand, owing to its costliness. Although it has found favour in certain of the finer printing styles, its consumption is small, and there seems to be but little prospect of its increasing. On the contrary, rather, the continued rise in the price of glycerine will affect the cost of production of the blue in proportion. It remains to be seen if there will follow any better success for the Badische Anilin and Sodafabrik, where it is about to be manufactured on a large scale. *Indophenol*: This new blue, manufactured by Cassella and Co., Frankfurt, is the most conspicuous amongst recent introductions. The following particulars are given in a circular, issued by the above firm, relative to this colouring matter: Its manufacture is protected under patent No. 15915 (German). Its most important application is in dyeing cotton goods, upon which it proves faster, both for soap and atmospheric influences, than indigo, and these important properties, together with its cheapness, will ensure its superseding the latter. It is sent into the market in two forms: (1) As a blue paste (N), adapted for printing designs, and (2) as an almost colourless paste, consisting of the reduced colouring matter (indophenol white), applicable for dyeing and padding. Its application in blue-style printing is at present limited by the fact that no means have yet been discovered for its discharge or reserve. The price of both products is fixed for the present at 6m. per kilo., or in greater concentration, if desired, at correspondingly higher prices. The mode of application is as follows: (1) *Indophenol White*—(a) *Printing Cotton Goods*: The cloth is prepared in sulphate, and printed with a mixture, according to the required shade, of 1 part of the paste to from 3 to 7 parts gum thickening (1 kilo. gum to 1 litre). After steaming half an hour to two hours it is run through a bichromate solution (10grms. to 1 litre) at 50° C. Two minutes' treatment in this bath will suffice. The cloth is washed from this and dried. (b) *Dyeing Yarns and Goods*: The fabric is prepared with sulphate, and dyed in a bath of indophenol white at 40° C., containing 5 to 10grms. of the paste per litre. It is lastly washed a short time in bichromate solution,

10 grms. bichromate per litre. The bichromate in this, as in the preceding case, may be replaced by a very weak solution of bleaching powder, in which the goods must be washed for about 15 minutes. (c) *Dyeing and Printing Jute Goods*: Jute is easily dyed and printed with indophenol to the deepest indigo shades. The processes exactly resemble those described above for cotton goods, with the exception that the mordanting with sulpholeate is unnecessary. (2) *Indophenol Blue Paste (N)*: In printing cotton goods experience has shown that the following two methods are equally effective. The choice of one or the other will be determined by circumstances. In both cases previous preparation with sulpholeate is necessary. (a) The colour mixture is as follows: 100 grms. indophenol (N), 25 c.c. acetate acid (6°B.), 150 c.c. tin acetate (20°B.). The tin acetate is prepared by heating ½ litre of tin oxide paste with 1 litre acetic acid, and filtering. The ingredients are well mixed and heated to 40°C. till the whole is colourless. It is then thickened by any convenient means, e.g., for middle shades, with 100 grms. gum solution (60 per cent.); for dark shades, with 100 grms. of the gum itself. (b) 1 litre indophenol (N) is diluted with 2 litres water, and the whole warmed to 25°C.; 3 litres of a solution of stannous chloride (10 per cent.) are added slowly, till the mass assumes a bright flesh colour, free from grey. It is then allowed to cool, and is thickened with 2 kilos. gum. The mode of developing this mixture after printing is that already described.

Kalle and Co., the aniline colour makers of Biebrich, now so well known for the excellence of their products, are introducing the two new colouring matters, crocein scarlet and crocein orange. These colours seem destined entirely to supersede the ponceaus, being much faster and more beautiful, and having other advantages over these, especially for wool dyeing, which will be at once recognised after a trial. The following are the modes of application of these colours: *Dyeing with Crocein Scarlet and Crocein Orange*. (a) *On Wool*: The goods are entered at 60 to 70°C., the bath containing for 100 kilos. wool 2 to 3 kilos. of the colour, 1 kilo. sulphuric acid (60°B.) and 5 kilos. alum. The bath is brought to the boil, and allowed to cool; the wool is then removed and washed cold. With very soft water the sulphuric acid may be omitted. Good results are likewise obtained with sulphuric acid alone, 2 to 2½ kilos. (60°B.) to 100 kilos. wool. (b) *On Cotton and Linen*: The bath is made up at 60 to 70°C. with 10 kilos. alum per 100 kilos. cotton, 3 to 4 kilos. colour being required for deep shades. A further 100 kilos. may be dyed in the same liquor and to the same shade after adding 5 kilos. alum and 2 kilos. colour. The process is economical, and gives excellent results. A second method, which gives better and faster shades, is as follows: The bath is made up, at boiling heat, with 10 kilos. of a good neutral soap and 10 kilos. gelatine of good colour. The cotton (100 kilos.) is well worked in this bath, wrung out, and dyed in a bath made up at 50°C., with 2½ kilos. alum and 3 to 4 kilos. crocein scarlet. A second quantity of 100 kilos. can be dyed in the same liquor, after addition of 1 to 2½ kilos. alum and 2 kilos. of colour. The following method has also been found to give equally good results: The cotton is scoured in hot soap, and mordanted in stannate of soda solution, being allowed to be 1 hour in a solution marking 3°B. The yarn is then wrung out and turned in alum, cold 15 percent. solution. It is dyed at 50°C. in the same manner as above. Further, all methods employed for dyeing other naphthol scarlets are also applicable to the crocein colours. (c) *On Silk*: The goods are dyed in a hot bath, scoured with tartaric acid. (d) *On Mixed Goods*: (wool and cotton): The process is identical with that for cotton. *Printing with Crocein Scarlet and Orange*: The thickening is prepared as follows: 1 kilo. wheat starch, 8-2 litres water, 1-8 kilo. of solution of gum tragacanth (6 per cent.) and 180 grms. olive oil are well boiled together, and allowed to cool. The colour mixture is prepared for the roller as follows: 100 to 110 grms. of colour are dissolved in 1 litre water, allowed to cool, and mixed with 2 litres of the thickener, with addition of 200 grms. acetate alumina 74°B. and 100 grms. of solution of calcium acetate (9°B.). The goods require steaming for about 1 hour.—C. F. C.

Alizarin-Blue Dye Soluble in Water (communicated by the Badische Anilin- und Sodafabrik to J. H. Johnson, London.)

COMMERCIAL alizarin blue paste, 100 lb., containing, say, 10 lb. to 12 lb. of dry colouring matter, are mixed with 30 lb. of a solution of sodium bisulphite, specific gravity 1.25, and allowed to stand in a closed vessel for a week or two. The soluble matter is filtered out and precipitated with common salt, filtered, pressed, and dried below 30°C. The resulting product is alizarin blue soluble in cold water.—W. P. T.

Preparation of Violet and Blue Colours from Para-nitrobenzaldehyde and Secondary or Tertiary Aromatic Amines. Otto Fischer, Munich. Ger. Pat. 16707, 1881.

THE authors prepare violet and blue colours, of the rosaniline series, by condensation of para-nitrobenzaldehyde with secondary or tertiary aromatic amines. They obtain nitroleuco bases of triphenylmethane, and convert them into derivatives of leucoanilin by reduction of the nitro group. These derivatives form colours by direct oxidation. Methyl, ethyl, benzyl, or phenyl may be substituted either before or after oxidation. Leuco bases, as well as the colours, may be transformed into sulphonic acids. Para-nitrobenzaldehyde and diphenylamine, for instance, yield a nitroleuco base, according to the following equation:—

By reduction of this leuco base diphenyl-para-leucoanilin is obtained:—

Oxidation of diphenyl-para-leucoanilin produces diphenyl-rosanilin, $\text{C}_{20}\text{H}_{12}\text{N}_3\text{O}$. A mixture of 5 parts of para-nitrobenzaldehyde, 12 parts of diphenylamine, and 12 parts zinc chloride is heated to 100°C., until the aldehyde has disappeared. By boiling with dilute hydrochloric acid the zinc chloride is removed, and a greenish-yellow substance left. The nitro group is then reduced with a concentrated solution of stannous chloride, until the precipitate, produced by addition of water, is easily soluble in alcohol. The whole is then precipitated by water, and the amido base purified by well-known methods. By oxidation, diphenyl-para-leucoanilin yields a violet colour, the salts of which are easily soluble in alcohol, and can easily be transformed into sulphonic acids.—F. H. and H. S.

Preparation of Colouring Matters from Para-nitrobenzaldehyde. O. Fischer. Ger. Pat. 16766, December, 1880.

WHEN aniline hydrochloride acts on para-nitrobenzaldehyde, nitrodiamidotriphenylmethane is not obtained at once, but by the action of 2 molecules of aniline on 3 molecules of nitrobenzaldehyde an intermediate product is obtained, which only after lengthened boiling with strong acids is converted in nitrodiamidotriphenylmethane. Aniline salts behave in a similar manner with other little volatile acids. If, however, salts of the primary aniline bases be used with heavy or non-volatile acids, then 2 molecules of aniline act on 1 molecule of nitrobenzaldehyde, and form at once the nitroleuco base, which can be oxidised either at once or after reduction of the nitro group.—M. J. L.

Preparation of a Ferruginous Printing Ink. W. Reissig. Ger. Pat. 17462, August, 1881.

To the black printing inks prepared from gelatine and lamp-black, the patentee adds ferrous and ferric salts, the compounds formed by these, with the cellulose of the paper and the material used in sizing, rendering it easy to detect the fraudulent removal of the black.—C. F. C.

Process for the Preparation of Colouring Matters of the Rosanilin Group from the Nitroleuco Bases of Triphenylmethane. O. Fischer. Ger. Pat. 10750, February, 1881.

By the action of paranitrobenzaldehyde on anilin salts in presence of zinc chloride paranitrodiamidoditriphenylmethane is obtained.

This nitrobase yields, on reduction, paralencanilin. The base can be converted in one operation into pararosanilin by acting on it with metallic salts, which at the same time renew the nitro group, and by carrying oxygen, withdraw hydrogen. From the melt obtained at 160° to 180° from 1 part of paranitrodiamidoditriphenylmethane, and 2 parts of solid ferrous chloride, fuchsian can be extracted with hydrochloric acid. Instead of ferrous chloride, other metallic salts can be used.—M. J. L.

Improvements in the Process for Preparing Artificial Indigo. Badische Anilin and Sodafabrik. Ger. Pat. 11837, 1880.

THE intermediate products of the transformation of orthonitrophenylpropionic acid into indigo are isolated by the application of the ethers of orthonitrophenylpropionic acid and can be used for the manufacture of indigo blue and of colouring matters related to it. (1) Alkaline reducing agents, such as ammonium sulphide, convert the ethers of orthonitrophenylpropionic acid into those of indogenic acid.

By the addition of an acid to the alkaline solution an insoluble precipitate is formed from which the indogenic ether is extracted by repeated treatment with dilute alkalis. The alkaline solutions are acidified, whereby the ether is precipitated. Indogenic ether, which crystallises in colourless prisms, melting at from 120° to 121° dissolves in alkalis without change. It is set free again by the action of carbonic acid on this solution. The acetyl compound formed by treatment with acetic anhydride, melts at 138°. The potassium or sodium salt, treated with ethyl iodide, forms ethylindogenic ether, melting at 98°. (2) By acting with concentrated sulphuric acid on orthonitrophenylpropionic ether, and avoiding a rise of temperature, the isomeric isatogenic ether is formed. It is precipitated from the red solution by the addition of water. After being purified by recrystallisation from hot alcohol it crystallises in yellow needles, which melt at 115°. (3) Reducing agents in an acid solution convert isatogenic ether into indogenic ether (described under 1). (4) Indogenic ether, when melted with from three to five times its weight of caustic soda, at a temperature ranging from 160° to 180°, is decomposed, the sodium salt of indogenic acid being formed. The reaction is finished as soon as alcoholic vapours cease to be given off. From the sodium salt indogenic acid is prepared by decomposing it with dilute sulphuric acid in the cold. In a state of purity indogenic acid is white, and colours but slowly blue. On exposure of its alkaline solution to the air, or by the action of acid oxidising agents, it is completely transformed into indigo blue. (5) By carefully melting indogenic acid, or by boiling its solution, indogen is obtained, carbonic acid being split off—

The indogen is separated as an oil, which is somewhat soluble in hot water, communicating to it a yellowish-green fluorescence. It cannot be volatilised by steam. The compound possesses weak basic as well as weak acid properties. Potassium pyrosulphate acts on a solution of indogen in potash, forming potassium indoxylsulphate. (6) From the intermediate products just described, indigo blue is formed by the action of the atmospheric oxygen, or of other oxidising agents, upon their alkaline or upon their acid solutions. If sulphuric acid be present the indigo-sulphonic acids are

formed. In contact with ammonia and atmospheric oxygen, indogenic acid and indogen are readily converted into indigo, even on the fibre, without the application of heat.

Indigo blue is likewise formed by the addition of an acid-oxidising agent, such as ferric or cupric chloride, to the solution of indogenic acid or indogen. (7) Indirubin, the isomer of indigo, is separated out by the addition of isatin to a solution of indogenic acid.

The same colouring matter is formed by adding isatin to a warm solution of indogenic acid in sodium carbonate. F. M.

Improvements in Preparing Artificial Indigo. Bad. Anilin and Sodafabrik. Ger. Pat. 17656, July, 1881.

CERTAIN products, intermediate between orthonitrophenylpropionic acid and indigo blue are available for the production of the latter. The ethers of the former are reduced by ammonium sulphhydrate to corresponding compounds of indogenic acid.

The ethyl compound crystallises in colourless prisms (m.p. 120°). By the action of concentrated sulphuric acid at the ordinary temperature upon ethylorthonitrophenylpropionate it is converted into the isomeric body, ethylisatogenate, crystallising in yellow needles (m.p. 115°). This is converted by reducing agents, in presence of an acid, into ethylindogenate, and this by saponification with an alkali into indogenic acid (p.m. 122°). The latter, under the further action of the alkali, loses CO₂, and is converted into indogen. The alkaline solution of this body gives, on treatment with potassium pyrosulphate, potassium indoxylsulphate. Ethylindogenate, indogenic acid, and indogen are easily converted by weak oxidants in presence of an acid or alkali into indigo blue.

In presence of concentrated sulphuric acid sulphonic acids are formed. On addition of isatin to a solution of indogen, indirubin, the isomer of indigo blue separates out.

If in the latter reaction the indogen is replaced by indogenic acid, the same substance is formed with evolution of CO₂.—C. F. C.

Blue Dyestuff. Patented in Germany by the Actien-Gesellschaft für Anilin Fabrikation, Berlin.

THE azo-colour known as Orange III. (the product of the reaction of diazobenzene sulphonic acid on dimethylanilin), is split up into its reduction products (amidodimethylanilin and sulphanilic acid) by heating it in a digester with ammonium hydrosulphide from 105° C. to 110° C. The liquid thus obtained is filtered from the deposited sulphur, and a blue dyestuff, identical with methylene blue (Caro's patent), is obtained from it by treating it with ferric chloride, according to Lauth's method. The colouring matter is then precipitated by the addition of zinc and sodium chlorides. Sulphanilic acid remains in the mother-liquor, and may be utilised for the preparation of new quantities of methyl orange, or any other azo-colour.—O. N. W.

Process to make Oil Colours Resist High Temperatures. R. Prüsser. Ger. Pat. 17450, Aug. 1881.

THE process consists in employing as the vehicle for the pigments a mixture of oil varnish with a solution of shellac and camphor in spirit. A lighter colour is obtained by treatment with chalk. The surface to be painted is first prepared by coating it with the above mixture previously ground up with gypsum. The colour is then applied by means of the vehicle in question.—C. F. C.

Process for the Preparation of Triamidotriphenylmethane and its Derivatives. O. Fischer. Ger. Pat. 16710, February, 1882.

PARA-ANIDOBENZALDEHYDE, in the form of the hydrochloride, combines in presence of zinc chloride with the aromatic amines with the loss of water to form leuco bases.

10 parts of paranitrobenzaldehyde are dissolved in 50 parts of alcohol, and mixed with 50 parts of hydrochloric acid; 12 parts of zinc dust are gradually added to the solution. After the reduction the mass is heated to 120° to 140° with 17 parts of aniline hydrochloride, and 10 parts of solid zinc chloride. The para-leucanilin obtained from the melt is oxidised to pararosanilin. If toluidine or xylidin, etc., be substituted for aniline homologues of para-leucanilin are obtained. If mono- or di-methanilin be used, the leuco bases of methyl violet are obtained. Primary, secondary, and tertiary aromatic monamines can be used instead of aniline.—M. J. L.

Manufacture of Ink. H. S. L. Gurney, Warrington. Eng. Pat. 3607, 1881.

TAN liquors, rich in gallic acid, are concentrated and treated with iron borings or cuttings in a rotating barrel. W. P. T.

Blue Colouring Matter. James H. Stebbins, jun., New York. U.S. Pat. 25350, March 21, 1882.

10lb. nitrosodiethylanilin chloride is dissolved in 500lb. water. 15lb. zinc dust is added, and the mixture stirred and heated to 60° C. The nitroso compound is thus reduced to diethylparaphenylenediamine chloride. The zinc dust is then filtered out, and to the solution is added (with constant stirring) 0.4lb. phenol, 8lb. bicarbonate of potash, caustic-soda solution (specific gravity 1.2), and 200lb. water. This mixture is cooled (with constant stirring), and acidulated with acetic acid, when the colouring matter is precipitated.—W. P. T.

DYEING AND CALICO PRINTING, STAINING, AND BLEACHING.

The Naphthalene Colours. Adolph Waescher. D. Feuerher Zeitung.

THE naphthalene colours belong to the most important inventions of the last years in the chemical branch of colours. The use of cochineal has been decreased considerably by these inventions, and if some time ago, when these new products were not yet perfect enough, it was believed that they never would be able to throw cochineal and its products out of the market, this opinion has now changed. With the better qualities of the naphthalene colours the shades can not only be produced just as bright as those prepared with cochineal, but even surpassing them. These dyes were first prepared in Hoechst alone, but at present also in Mannheim (Germany). They are of the greatest importance in wool dyeing, and especially in cloth dyeing. The goods intended for the east of Europe, for which cochineal generally was used, are now dyed with these colours. They have therefore become very important for such countries as Austria, Bohemia, Poland, Saxony, &c. America also uses at present many naphthalene colours. Cochineal colours show a greater fastness against light, and it is said that naphthalene colours will not stand sunlight as well as is the case with cochineal. Although this is not so exceedingly important, it must be said that naphthalene colours should be preferred to cochineal; that in fulling the former do not change their shade, although they slightly bleed, while cochineal gets blue, which cannot be repaired again by reviving. Also against sulphuring naphthalene colours show great resisting capacity, and they can be produced on the fibre with greater ease. Glaubersalt, or sulphuric acid and alum, with a little tartar, is used as a mordant. In dyeing, it should be especially observed that the necessary sulphuric acid 50° be added, and the goods not

boiled too much. If at the end of the dyeing process a little chloride of tin is added, the brightness of colour can be increased. Alum is not very well liked, as it makes the wool hard, and is only occasionally added, in order to allow of the adding of other colouring matter (resorcin colours) to the same dye bath. For the preparation and dyeing of mixed goods, the naphthalene colours are of great importance, as they dye the same colours and shades on cotton as are produced on wool.

Cocceine, which belongs to the naphthalene group, produces a fine carmoisine, and distinguishes itself by its fulness and its bluish shade. The dyeing has to be done carefully, and especially the addition of sulphuric acid has to be done very gradually. After the boiling, a little more chloride of tin may be added, by which the purity of colour is increased. In combination with acid, cocceine produces various cherry shades of moderate fastness. Of the utmost importance is the Bordeaux dye, which is used very much on loose goods, wool, and especially on silk. Lighter shades, produced by this colour, are similar to archil. Although archil is easier dyed even, the advantages of Bordeaux dyes consist in the greater fastness and in the easier way of producing certain shades. If the goods are dyed with archil or indigo, the shade can easily be missed, as acid turns yellowish and alkali blue. Bordeaux dyes are not liable to be changed by these influences. Combined with the greater capacity of resistance against acids and leys, the Bordeaux colours show considerably greater fastness against light. In silk dyeing, naphthalene colours are of the utmost importance, on account of the easy manipulation and the brightness of the shades. As they dye with soap and sulphuric acid, all acid colours can be dyed in one bath to produce the greatest variety of shades. For cotton these naphthalene dyes are also important. They are fastened upon the fibre by soaping, and alumina and tin mordants. If the preparation with the mordants has been done carefully, very fine colours, pretty fast against light, can be produced, which are important for dyeing mixed goods. As resorcin colours dye with the same mordants as naphthalene colours, both dyes can be used combined. The Bordeaux colours are not very well fitted for cotton dyeing, as the shades are too expensive, and they can be produced with less cost with other wares.

Enlaving Horn, Celluloid, etc., with Pigment Colours. F. A. Nickerson, Springfield, Mass.

UPON the smooth horn raised figures are painted in pigments slightly softened with oil or spirit. When these have indurated, the horn is heated to the softening point, and the pigment still hard pressed into the substance of the horn.—W. P. T.

Aluminium Sulphocyanide.

ALUMINIUM sulphocyanide has been found to be much preferable to acetate as a mordant for nitroalizarin (alizarin orange). It gives very bright shades, and should be used, together with a suitable lime salt, to increase the fastness of the colour. It has the further advantage that colours prepared with it will keep unaltered for a long time.—O. N. W.

The Structure of the Cotton Fibre and its Relations to Dyeing. Leipz. Färberei-Zeugl. Zeit. i, p. 2, 1882.

THIS paper is itself an abstract from the researches of F. H. Bowman on this subject. The author comes to the conclusion that all colouring matters may be divided into three distinct classes, according to their affinity for the cotton fibre: (1) Dyestuffs which combine with cellulose by chemical affinity. These do not require any mordant. (2) Dyestuffs which are precipitated in an insoluble form in the interior of the fibre, and which are, consequently, mechanically combined with it. (3) Dyestuffs which, in order to combine with the fibre, require a mordant. In this case the mordant acts as a connecting link between the fibre and the colouring matter. These classes cannot, however, be distinctly separated, and there are many dyes which hold an intermediate position. Turmeric and indigo may

be regarded as fair examples of the first class. They are precipitated from their solutions by the unmordanted fibre, whilst the remaining dyebath is considerably weakened. A microscopical examination of the dyed fibre shows a very irregular distribution of the dyestuff, which is owing to a different degree of the ripeness and purity of the cotton. From this the author concludes that much remains to be done in the way of a chemical preparation of the fibre, so that a regular absorption of the dyestuff may be insured. As an example of the second class, the author quotes the mineral colours, such as Prussian blue and chrome yellow. In these cases the fibre acts chemically, by the absorption of the liquids which are intended to form the dye by their decomposition. This decomposition takes place in the interior of the fibre. The colour is then deposited in the shape of a precipitate, which, in some cases, may be recovered unaltered by the destruction of the surrounding cellulose. The third class of dyes is very numerous. Most of the anilin dyes belong to it. The fibre must always be treated with some mordant, in order to make it apt for the absorption of the dyestuffs. There is a chemical combination formed in this case between the fibre, the mordant, and the dye. This may be clearly seen under the microscope. Sections of fibres dyed, for instance, with anilin dyes and tannin appear uniformly coloured throughout the cellulose. There is no precipitate to be seen in the interior of the fibre. In some cases a stratification of the dye may be observed, there being more colouring matter deposited towards the interior of the fibre. Unripe cotton fibres generally resist the dyeing process and remain white. This lack of affinity may be effectively counteracted by an alkaline treatment, commonly known as "mercerising" of the fibre. In the conclusion of the paper the author advocates the necessity of a new and more effective treatment of the fibre before dyeing. This treatment should both increase the affinity of the fibre for colouring matters as well as its strength and durability.—O. N. W.

New Method for the Extraction of Madder. E. Lanber.

THE madder root is first boiled with weak sulphuric acid, and then during three hours with freshly-precipitated ferrie hydrate. A lake is formed, which is carefully washed and then decomposed by hot sulphuric acid. The dyestuff thus obtained may be used, after filtering and renewed washing, for dyeing and calico printing.—O. N. W.

Application of Artificial Indigo for Printing on Cotton Goods. Henri Witz. *Leipziger Färber-u-Zeugdr. Zeit.* i., p. 1, 1882.

THE author is still hopeful of an ultimate success of Professor Bueyer's invention. He predicts a more general use of propiolic acid than has hitherto been made of that compound, and describes in detail the two different methods which may be used for the transformation of propiolic acid into indigo on the fibre. The first method may be applied to bleached goods without any previous preparation. The colour is prepared by mixing 4 kilos. of propiolic acid paste with 1 kilo. of finely-powdered (25 per cent.) borax, and thickening by means of 7 kilos. of starch paste. To this colour the reducing agent, in the shape of sodium xanthate, is added immediately before printing. The quantity of xanthate required is 1½ kilo. The borax may be replaced by sodium acetate. If a lighter shade of blue be required, the colour may be mixed with starch paste containing about 100 grms. of xanthate in one litre. The formation of indigo begins immediately after the addition of the xanthate. The colour should, therefore, be used at once, as it will not keep. When the pieces are printed they should be dried at a moderate heat, not exceeding 40°C. The colour develops itself within 48 hours. The goods may then be washed, first in cold and then in hot water. They retain a powerful and most repulsive smell, to remove which the author proposes to treat them with sodium hyposulphite. After this treatment they may be soaped for twenty minutes at a temperature not exceeding 40°C. Anilin black may be printed in combination with artificial indigo as

well as the usual aluminum and iron mordants. After the development of the indigo and black the pieces may be dyed in artificial alizarin, when only the mordanted parts will absorb the colouring matter and become red, or, if iron mordants be used, violet. If steam-colours be used together with indigo, the author recommends steaming at a low pressure, high-pressure steam being very injurious to indigo. In the second method the goods should be impregnated with a solution of sodium xanthate previous to printing. The solution used for that purpose contains 150 to 200 grammes of sodium xanthate in one litre. Four litres of this solution are required to prepare a piece of calico 60 metres long. After drying, the goods are printed with a colour containing 4 kilos. of propiolic acid paste (25 per cent.), 1 kilo. powdered borax, and 7 kilos. starch paste. Another lighter colour consists of 2 kilos. propiolic acid paste, 1 kilo. powdered borax, 1½ kilo. sodium acetate (crystals), 12½ kilos. starch paste, and 3 kilos. of tragacanth paste, the latter containing 40 grammes tragacanth in every litre. These colours keep perfectly well. The treatment of the goods is exactly similar to the one given. Alum and iron mordants may also be used in this case, as the xanthate does not interfere with their development.—O. N. W.

NOTE BY THE ABSTRACTOR.—An objection to the use of artificial indigo, besides its high price, is the repulsive smell which it retains. The cause of this colour is an ether of xanthic acid. This smell will return after some time, even if it has been seemingly got rid of by much washing and scouring. To obviate the preparation of the goods with sodium xanthate (2nd method), as well as the use of printing colours, which are liable to decompose within a few hours, it has been proposed of late to introduce insoluble xanthates into the colours. It is the zinc salt which has been found to best answer this purpose.

Bleaching Linen and Hemp Threads and Tissues. Communicated by A. Delahove to C. T. Abel, London. Eng. Pat. 3575, August 17th, 1881.

THE threads or tissues are subjected to successive boilings in alkaline liquids, to remove pectinic substances from the cellulose. They are then passed through a solution of chloride of lime and a solution of sulphate of alumina saturated with hydrate of alumina. They are then boiled in soap solution and ammonia. If required absolutely white, the process is repeated.—W. P. T.

Dyeing Anilin Black on Cotton. Gustav Jugenborg, Rydboholm, Sweden. Eng. Pat. 3332, August 10, 1881.

61.2. anilin salt is dissolved in one-third gallon of water at 50° Centigrade. Then 3lb. chlorate of potash is dissolved separately in 4 gallons water at 100° Centigrade. These are allowed to cool, and are mixed together. The cotton is thoroughly immersed in this, freed from superfluous liquor, and dried; it is then immersed in an oxidising bath, say 2 pounds of potassium bichromate to 6 gallons of water. When completely oxidised it is taken out and rinsed. The material thus dyed will, the inventor says, resist the action of sulphurous acid.—W. P. T.

Apparatus for Scouring, Dyeing, &c., Piled Fabrics. James Worrall, Salford, and John Kershaw, Halifax. Eng. Pat. 3221, July 23, 1881.

THIS invention consists in the use of rotating winces or beaters, mounted in shallow troughs, supplied with liquor from a downpour, or from an underlying tank, for the purpose of discharging a limited amount of such liquor into piece goods travelling over or past such rotating winces or beaters; also in yielding plates for retaining the liquor in contact with the travelling piece goods; also a rotary or travelling porous surface, used in conjunction with the aforesaid beaters, through which surface the liquor is capable of being drawn for the purpose of collecting on its surface the lint or fluff detached from the cloth under treatment.—W. P. T.

Liquid Rouge for the Toilet. C. D. Abel (a communication from M. A. Lade, Berlin). Eng. Pat. 3442, Aug. 9th, 1881.

ONE to four of eosin is added to 1,250 water heated to 100° F. When cooled down, 20 of glycerine and 750 of alcohol are added. This is not poisonous like the ordinary rouge made of white lead and carmine.—W. P. T.

Dyeing Blue Colours. J. H. Stebbins, jun., New York. U. S. Pat. 255349, March 21st, 1882.

THE cotton cloth is impregnated with an aqueous solution of the soda salt of α -naphthol and dried at 150° F. This cloth is then printed with a solution of nitroso-diethylaniline chloride and an alkaline solution of grape sugar thickened with starch. After printing it is stained and washed.—W. P. T.

ACIDS, ALKALIS, SALTS.

Preparation of Perchloric Acid. Mon. Scient., vol. xi., p. 961.

IT is recommended that this acid should be prepared by the user himself, the cost in this case being 20 to 25 francs per kilo., whereas the manufacturers demand 90 francs per kilo. It can be prepared in the following manner without the slightest danger. Pure barium chlorate is dissolved in luke-warm water and dilute sulphuric acid is added. The precipitate is allowed to settle, and the clear liquid poured off, and the barium sulphate thoroughly washed. The chloric acid solution is then evaporated over a fire until the concentrated solution becomes yellow, and on further evaporation produces a peculiar noise. The liquid is divided into two parts, placed in two dishes, 19 centimetres in diameter and containing about 700 cubic centimetres, and evaporated further until the liquid is quite decolourised and thick white fumes are given off. In order to lessen this unavoidable loss of perchloric acid, the liquid can be diluted from time to time with a little water. The colourless liquid is then distilled in a retort heated on a sand bath and collected in a long-necked receiver. The perchloric acid so obtained contains traces of iron. From 4 kilos. of barium chlorate, 1 kilo. of perchloric acid of 45° B. is obtained. The barium chlorate occurs in commerce, and costs 4 francs the kilo.—M. J. L.

On the Freezing Point of Sulphuric Acid. By G. Lunge. Ber. d. Deutsch. Chem. Ges., 1881.

ON cooling sulphuric acid, crystals separate, at first not readily, but only after some time; but when they have once been formed they are separated more easily afterwards, and always at the same temperature, even when the crystals have been previously melted at 30°. With the exception of the first time, the freezing point is found pretty constant on repeating the experiment with the same acid; but the melting point of the crystals could not be ascertained accurately in some cases, as the thermometer went on rising. Where it is higher than the freezing point, the figures found for the melting point cannot be as trustworthy as those found for the freezing point. The specific gravity was determined by means of a Mohr-Westphal balance, was corrected for 15°, and the degrees B. calculated from it by the formula

$d = \frac{144.3}{144.3 - n}$. The following were the results obtained:

Spec. Gr. at 15°	B.	Freezing point.	Melting point.
1.871	58°	fluid at -20°	—
1.881	59°	—	—
1.712	60.05	—	—
1.727	60.75	-7.5	-7.5°
1.732	61	-8.5	-8.5
1.740	61.8	-9.2	+1.5
1.767	62.65	+1.0	+0.5
1.790	63.75	+1.5	+8.0
1.807	64.15	-0.0	-0.0
1.822	64.15	fluid at -20°	—
1.812	60	—	—

J. G.

* In this case the observations of the freezing point differed considerably, between -12° and -6°.

French Process for the Preparation of the Nitrate of Iron Mordant. Marius Moyret. Leipziger Färber und Zeugl. Zeitg. (1) p. 22, 1882.

TO prepare 100 lb. of this mordant introduce 80 lb. crystallised ferrous sulphate into a large wooden or cast-iron vat with wooden cover. There are three holes in this cover. One of them contains an exit-pipe for the nitrous gas formed into another. The glass tube for the introduction of nitric acid is inserted, and the third one is intended to receive a stirrer. The ferrous sulphate crystals are covered with a mixture of water with 10 to 15 per cent. of the weight of the salt (?) (the abstractor) of ordinary nitric acid (36° B.), and 6 to 7 per cent. sulphuric acid. The reaction begins at the ordinary temperature, and is finished by the introduction of steam. The escaping vapours of nitric oxides are led through a system of earthenware Woulf's bottles containing water. They are thus condensed into nitric acid, which may be used over again.—O. N. W.

Utilising Chemical Residues. Walter Weldon.

CuCl₂ is added to copper extractors' residual liquor and CaSO₄ precipitated. The remaining liquor is treated with oxide of iron or lime, and this mixture is added to the yellow liquors of alkali waste. S and FeS fall, and can be used for sulphuric acid making, and H₂S is given off.—W. P. T.

Manufacture of Ammonia. Fredk. Twinch, Rue Trallont, Paris (communicated to C. D. Abel, London).

THE inventor bases his scheme on the assumption that nitrogen dioxide, in acting as a carrier of oxygen from the air to other bodies, leaves the nitrogen of the air in a nascent state, and hence able to combine with nascent hydrogen. Under this idea he passes air, steam, and nitrogen dioxide over a mixture of caustic soda and zinc, and states that the nitrogen dioxide and steam give up oxygen to the zinc (zincate of soda being formed); that nascent hydrogen is thus liberated from the water and nascent nitrogen from the air, through the mediation of the nitrogen dioxide, and the two combine to form ammonia.—W. P. T.

Removing Iron from Aluminous Solutions. Conrad Semper and Constantine. Fallberg, Philadelphia. Eng. Pat. 5579, Dec. 20, 1881.

ANY ferrous iron is first changed into ferric salts by any convenient oxidising medium, and the solution neutralised. The iron is then precipitated as plumbate of iron by means of dioxide of lead. The plumbate of lead is filtered out, washed, and stirred up with nitric acid, and thus dioxide of lead is regenerated.—W. P. T.

Absorbing and Utilising Sulphurous Acid Gas. Heinrich Preeht, Stassfurt (communicated to C. D. Abel). Eng. Pat. 3443, Aug. 9, 1881.

THE gases cooled down to 100° Centigrade, and as free from sulphuric acid as possible, are passed over or through moist (or milk of) hydrate of magnesia. The sulphide, on being heated, gives up the SO₂ again. The sulphate remaining in solution can be utilised or made to give up SO₂.—W. P. T.

Manufacture of Salts of Magnesia and of Zinc. Adrien Languetin, Paris. Communicated to A. M. Clark, London. Eng. Pat. 3844, Sept. 3, 1881.

HEATED carbonate of magnesia, magnesite, or dolomite, is treated with chloride of calcium. Result, chloride of magnesium and carbonate of lime. If carbonate of magnesia is to be obtained from the chloride, the latter is digested with carbonate of lime under pressure and at a heat of 150° to 200° (Centigrade). The same reactions occur if zinc salts be substituted for magnesium salts.—W. P. T.

Manufacture of Strontium Hydrate. Carl F. Claus, London. Eng. Pat. 3748, Aug. 25, 1891.

A HOT solution of strontium sulphide is caused to react on a hot solution of zinc oxide in a caustic alkali. Result, sulphide of zinc precipitate and strontium hydrate in solution. The latter crystallises out of a hot saturated solution on cooling.—W. P. T.

Purification of Alkaline Lye. Carey, Gaskell, and Hurter, Widnes. Eng. Pat. 1161, 1878.

IN order to remove silica from alkaline solutions the patentees add, before or during carbonating, such solutions, alumina, or a salt of alumina (preferably a solution of bauxite in caustic soda), in sufficient quantity to cause the whole of the silica to precipitate in combination with the alumina.—F. H. and H. S.

Process for Preparing Ammonia from the Nitrogen of the Air and from the Hydrogen of Water. Gesellschaft L'Azote. Ger. Pat. 17070, January, 1881.

INTO the furnaces A and B melted zinc is brought. Through the channel a air streams into A, through the channel b water passes into B. In both zinc oxide is formed. The free nitrogen and hydrogen carry zinc oxide with them, first into the hot chambers M and N, where the retorts r and s are heated by the hot gases, and then into the further spaces O and P, where the zinc oxide falls into the funnels n. The gases pass further through the openings C and D into the channels E and F. Starting from these, they can be let off through the

openings c and f, as desired, into the retorts r. These latter contain titaniferous spongy iron, which retains the nitrogen. If then first nitrogen and then hydrogen are admitted, ammonia is formed. The zinc oxide is mixed with carbon and reduced in the retorts s. The carbonic oxide thus escaping is burnt to carbon dioxide, which is allowed to combine with the ammonia. The retorts can also be replaced by cylindrical metallic vessels, which can withstand a pressure of 10 to 15 atmospheres. These cylinders are charged with platinized carbon or pumice, and the nitrogen is pumped in by a force pump under 10 atmospheres pressure. The porous bodies employed absorb a great deal. Finally water is pumped in, the pressure being maintained.—W. S.

Obtaining from Mineral Phosphates the Insoluble Phosphoric Acid in the form of Soluble Alkaline Phosphate, and Regeneration of the By-products produced. Drevermann. Ger. Pat. 17168, July, 1880.

IN order to obtain phosphoric acid in the soluble state from mineral phosphates, e.g., slugs from the dephosphorisation process, these substances are treated with hydrochloric acid of such concentration that the separation of gelatinous calcium silicate and the reprecipitation of already dissolved phosphoric acid is prevented. This is accomplished either in closed vessels, with heating to 80° to 90°, or in open vessels with addition of iron-silings, so that ferric phosphate may be formed. The latter is converted into alkaline phosphate by treatment with alkaline sulphides, ferrous sulphide being also formed. The latter is washed, and the solution (filtrate) is concentrated till crystallisation of the alkaline phosphate ensues. When phosphorites for manurial purposes are

employed these are treated as above. The ferric phosphate is heated with milk of lime, air being blown into the liquid at the same time. The precipitation is continued up to the separation of the iron as ferric hydrate and the manganese as calcium manganite. The liquid

remaining after washing the last-named substance is evaporated down, the lime precipitated with magnesium sulphate, the filtrate containing magnesium chloride evaporated till solidification of the latter ensues, when it is exposed to a white heat. The hydrochloric acid

evolved is thus recoverable, as also the magnesium oxide. The latter is rid of chlorine by grinding wet with calcium hydrate (thick milk of lime). The furnace for igniting the magnesia is shown above. A is the vertical shaft of the furnace, B the mouth, which can be closed, C the hole for charging, D the escape-pipe for products of combustion and the hydrochloric acid and other vapours, E the entrance for the generator-gases into the combustion area, F the tuyeres for heated air-blast, G the space for the ignited magnesia to fall into, H, I, J channels for withdrawing charge, K, L doors of the same, M, N the passages through which the heated air is led for the blast, O, P heating-space, Q, R entrance for the not-previously heated air for the combustion.—W. S.

Process and Apparatus for the Synthetic Preparation of Sulphocyanides and Ferrocyanides. U. De Glünzburg and J. Tscherniac. Ger. Pat. 16005, April, 1881.

FOR the preparation of ammonium sulphocyanide the following apparatus is now used. An aspirating and forcing pump, made wholly of iron, conducts carbon bisulphide and ammonia into a row of autoclaves made of wrought iron. Each autoclave is provided with an agitator, a thermometer, a manometer, and three stop-cocks, viz., one to regulate the flowing in, the second to regulate the emptying, and the third, through which the gases, which collect, are led out. The autoclaves are contained in a vessel filled with steam, so that they can be heated to 120° to 130°. At the end of the reaction (under 15 atmospheres pressure) the solution is run into the distilling apparatus. At 105° to 110° the ammonium thiocarbamate is decomposed into sulphurated hydrogen and ammonium sulphocyanide. An apparatus (called an

"Emptier," Entleerer) is connected with the distilling apparatus, which separates the vapours of sulphuretted hydrogen, carbon bisulphide, ammonium sulphide, and water completely from the liquid carried with them. The apparatus for distilling is made of aluminium. Calcium sulphocyanide is obtained by heating the ammonium compound with lime by means of steam coils to 130°. Potassium sulphocyanide is prepared by decomposing the calcium compound with potassium sulphate in open cylindrical vessels. Some calcium sulphocyanide remains in solution, and is precipitated by a little potash. The solution is boiled down at 130°. On cooling, all the potassium sulphate separates out, and on boiling down at 135° to 140° the potassium sulphocyanides crystallise out. To obtain potassium ferrocyanide from potassium sulphocyanide, finely-divided iron, not ferrous oxide, is used. The desulphurisation of the sulphocyanide takes place between 360° and 450°. The sulphocyanide is placed with the iron powder in a hermetically-sealed iron cylinder, in which there are several iron balls. When the substances are mixed, the mass is placed in a crucible, which can be tightly closed by a lid. This is then placed in a double-walled chamber, between the walls of which sulphur is brought to boiling (450°). A high tube is connected with the chamber, in which the sulphur vapours condense. The crucible is allowed to cool without access of air.—M. J. L.

BUILDING MATERIALS, CLAYS, MORTARS, CEMENTS.

Tripolith. Dingl. Polyt. Jour., March, 1882, p. 433. IN this paper it states that according to the experiments of Treumann (*Pharm. Zeit. für Russland*, 1881, p. 414), and of Petersen (*Ber. der Deut. Chem. Ges.*, 1881, p. 2363), the tripolith manufactured according to the process described in Schenk's patent (Ger. Pat., lit. 80, No. 13013, July, 1880) has not the constitution claimed for it. It further states that there is no advantage in using it in preference to gypsum. According to Professor Vogt (*Deut. Med. Woch.*, 1881, No. 15), it is advisable to use gypsum and not this tripolith for bandages, as the latter is not suitable in all cases, and also leaves a disagreeable powder when used. Neither in surgery, cements, etc., does it appear to possess the least advantage over gypsum.—M. J. L.

Experimental Researches on the Constitution of Cements and the Theory of their Setting. M. H. Le Châtelier. *Compt. Rend.* xciv., 13, March 27, 1882.

THE author gives an account of researches prosecuted during the past twelve months, but not yet quite completed. By aid of microscopic examination in polarised light he has been able to classify the constituents of Portland cement, and has prepared compounds identical in chemical and optical properties with these constituents. Among them the following are the most important: (1) An aluminate of lime, $\text{Al}_2\text{O}_3\cdot 3\text{CaO}$, occasionally mixed with free lime; (2) a silicate of lime, $\text{SiO}_2\cdot 2\text{CaO}$, the chief if not the only essential constituent of cement; (3) a deep brown-coloured aluminoferrite of lime, $2(\text{AlFe})\cdot \text{O}_3\cdot 3\text{CaO}$. This is the most fusible constituent of cements, and forms a gangue from which, when the cement is fused, the silicate of lime (2) crystallises. It is very slowly acted upon by water, and has little influence on the setting of the cement. (4) Very small crystals, not acted upon by water, and probably magnesium compounds. The action of water on cements produces many different compounds, of which the one most effective in hardening the cement crystallises in hexagonal lamellæ. It is derived from the calcium silicate, and is most abundant in non-aluminous cements. Its composition has not yet been ascertained. There are also formed, but only in aluminous cements, long interlacing needles, especially abundant in quick-setting cements. They are formed by the action of water on the calcium aluminate, of which 0.3 gramma dissolves in one litre of water. Salt water dissolves it more freely, but with partial decomposition. This ex-

plains the practical difference observed in the setting of cements, the most rapid being very aluminous. The other compounds formed during the setting of cements have not yet been investigated by the author. The calcium silicate possesses a remarkable property, which gives a key to the explanation of a phenomenon frequently observed in the manufacture of cements. Heated to fusion (i.e., the melting point of soft iron), it forms a semi-translucent stony mass, which on being slowly cooled disintegrates, and is finally reduced to an impalpable powder, consisting of minute twinned crystals. The unequal dilatation of the opposed faces of the twins is undoubtedly the cause of disintegration. If the cement be not so strongly heated the twins are not formed, and the mass is not reduced to powder by cooling. The author notes that monticellite (a calcium magnesium silicate) does not undergo these changes on heating and cooling. Hence the necessity of magnesium in the lining of converters for the dephosphorisation of steel.—A.S.

Portland Cement. Isaac Charles Johnson, Mayfield House, Gravesend. Eng. Pat. 3535, Aug. 15, 1881.

INSTEAD of wet-grinding he churns up the chalk and clay with but a small amount of water, and when thoroughly comminuted and mixed the thick slurry is forced through an orifice and formed into briquettes.—W. P. T.

Artificial Stone. Carl F. Leidlholdt, Neillsville, Wisconsin. U.S. Pat. 254342, 1882.

Two parts of hydraulic lime, 4 of clear sharp sand, and 1 of leached wood or coal-ashes form the basis. This is formed into a paste, with a solution of glue, and moulded to required forms. When making large stones ground calcined bones are added.—W. P. T.

Artificial Stone. W. W. Patterson, Corning, Iowa. U. S. Pat. 254363, Feb. 28, 1882.

ONE part of Portland cement, 1 of Milwaukee cement, 1 of lime, and 5 of sand form basis. As a binder, 30 gallons of water, 2lb. of salt, 1lb. of saltpetre, 1lb. of alkaline substance, and $\frac{1}{2}$ lb. of carbonate of ammonia. The basis is made into a mortar, with this solution, and moulded into the required forms.—W. P. T.

Artificial Stone. Stephen Trone, Avoca, Ill. U.S. Pat. 254247, Feb. 28, 1882.

EIGHT parts of sand or gravel and 1 of Portland cement form the basis; $\frac{3}{4}$ lb. of rye flour, 2lb. of "Geo. T. Lewis" ley, or a combination of soda and soda-ash or other suitable ley, 10lb. of common salt, and 40 gallons of boiling water, form the solution. The basis is made into a paste with the solution, and moulded to shape.—W. P. T.

Preserving Wood. Jas. P. Card, St. Louis, Miss. U.S. Pat. 254274, Feb. 28, 1882.

THE wood is impregnated with a solution of chloride of zinc or other antiseptic soluble mineral salt. The outer layers of the wood are then dried by currents of air and heat, and then saturated with hot creosote oil. The creosote oil thus prevents the soluble antiseptic from being washed out.—W. P. T.

METALLURGY, MINING, Etc.

The Quality of Steel to be Used for Rails.

M. GUESSE, the Inspector-General of Mines in France, is the author of a valuable paper which appeared in the December number of the *Revue des Chemins de Fer* of last year, dealing with the important question of what is the best kind of steel to be used for rails. It is proposed to give briefly the results of his investigations. A com-

mission, appointed some time ago, to inquire into the best kind of rails used in France, considered the form only, and merely touched upon the above question in the appendix to its report, giving to hard steel the preference from point of durability, but to soft steel as far as risk of fracture is concerned. In France the Nord Railway and the Midi Company prefer respectively a breaking stress of from 60 to 74 kilos. and from 79 to 83 kilos. per square millimetre, with an extension of from 10 to 20 per cent., and from 4 to 11 per cent. In Germany, Sweden, Russia, and all except the State lines of Austria, a minimum strength of 55 kilos. and contraction of area of 20 per cent. are prescribed, but on some lines still softer steel is used. Besides the testing machine, impact tests are often used, which give very much the same results. In the United States and Austria, a monkey of 1,000 kilos. is used, with a fall ranging from 4.75m. to 6.5m.; while the French companies employ one of 300 kilos., with a fall of 2.5m. The hardest steel is that on the Midi Railway, and the softest that on the Ouest, while other countries use metal not nearly approaching the latter in hardness. Some analyses, made by the Lyons Company, of steel exhibiting the same mechanical properties, but of very different composition, go to prove that the same degree of hardness can be obtained by very different means. This militates against the proposal made by Dr. Dudley, in his report to the Pennsylvania Railway, to limit their steel to that of which the chemical composition was represented by a definite formula. In the course of the investigations which led him to this result he took specimens of twenty-six rails, half of which had stood well, and half of which had failed. His analysis of these confirmed the already-existing opinion that excess of carbon, silicon, etc., injures the quality of the metal, and he proposed that the steel supplied to his company should contain them in the following percentage: Carbon, 0.25 to 0.35; manganese, 0.4 to 0.3; phosphorus, not over 0.1; silicon, not over 0.04. Then, assuming two units of silicon, three of carbon, or five of manganese to have the same hardening effect as one of phosphorus, he expresses the above analysis in phosphorus units thus: Phosphorus, 10; carbon, 8 to 10; manganese, 6 to 8; and silicon, 2. M. Gruner protests strongly against this, and, indeed, from the results of practice, it would seem that Dr. Dudley's experiments only prove that an undue proportion of these elements is injurious to the resistance of the rails. These researches, moreover, which were of a very elaborate kind, also proved the fact, already foreshadowed by Mr. J. Smith and Mr. Price Williams, that soft steel wears better than hard. Sixty-four good rails were taken from the main line of the Pennsylvania Railway, some from all possible positions, and tested by tearing, shearing, tension, bending, and chemical analysis. The wear was determined by comparing the area of the worn with the original section, their densities being also accurately estimated. The results of the experiments showed throughout that the soft rails were the least worn and the least rich in carbon and in impurities generally. The average of the analysis was as follows:—

	C.	Mn.	P.	Si.	Tot.
Soft rails, little worn.....	0.351	0.191	0.077	0.008	0.562
Hard rails, much worn.....	0.350	0.017	0.100	0.017	1.190

It may be asked whether the inferiority of the rails containing these impurities is due to them as such, or to the hardness which they assist in producing; but further statistics are required to settle the question. In the discussion which followed the presentation of Dr. Dudley's report, great opposition was raised to the formula proposed by him, but the general truth of his observations was admitted by all. According to M. Gruner, steel containing a large proportion of carbon can contain very little of the other elements above mentioned without becoming injuriously brittle, and if this be established it will be a great aid to the judgment of the maker. Dr. Dudley advocates a breaking strength of not more than 50 kilos. per square millimetre, with an elongation of not less than 10 per cent. As the reason of the better wear of soft rails, the latter gentleman suggests that the tiny inequalities, being less brittle, are less liable to be

broken off than in the case of harder steel, and are soon flattened out, so as to present no protuberance at all. M. Gruner, however, lays great stress on the fact that the more impure steel is the more easily it rusts, and thinks this accounts in a great measure for the better wear of soft rails; but it is generally held in England that rails in use do not rust, so that his theory will hardly find favour here. Another argument for soft steel on the Continent is, that the thin web-foot of the Vignoles rail in common use are frequently hardened in passing through the comparatively cool rolls, and the softer the steel the less chance there is of this. Moreover, the soft steel can be rolled at a greater heat, requires fewer grooves, and less time to finish. According to M. Gruner, in heavy rails the thickness of the foot should not be less than from 8 to 10 millimetres, and should increase by a regular slope from the edge to the middle. This is especially important, as in passing through the grooves, if the edges or too thin, are get hardened before the last groove, serious inequalities of strain are produced in the finished rail.—A. R. D.

Tungsten Bronzes. J. Philipp. Ber. Berichte, xv., 499-510.

By heating sodium tungstate in dry hydrogen gas, a crystalline body of golden yellow colour is obtained, which Woehler regarded as a mixture of the oxides of tungsten and sodium, the reaction being illustrated by the formula $2\text{WO}_3 + \text{Na}_2\text{O}$. Malaguti found WO_3 (=93.15 per cent.) and Na_2O (=8.06 per cent.). From these numbers and from the loss of weight which sodium tungstate suffers when heated in hydrogen, the formula $\text{Na}_2\text{W}_2\text{O}_6 = \text{Na}_2\text{WO}_4 + \text{W}_2\text{O}_5$ has been deduced. Scheibler obtained a blue tungsten bronze by electrolyzing fused sodium tungstate. He gives the formula $\text{Na}_2\text{WO}_4 + 2\text{W}_2\text{O}_5$. The author, in conjunction with Schwebel, found that the yellow bronze, powerfully resisting acids and alkalis, suffers decomposition when heated in a finely-divided state with an ammoniacal silver solution, metallic silver separating, whilst sodium tungstate remains in solution. As the quantity of separated silver is equivalent to the oxygen necessary to completely oxidise the compound, this reaction could be used for the accurate determination of the composition of the bronzes. Two fine specimens of golden-yellow colour gave 40 per cent. of deposited silver, according to Malaguti's formula $\text{Na}_2\text{W}_2\text{O}_6$ requires only 29.11 per cent. Moreover, the quantities of tungstic acid and sodium oxide obtained on analysis showed the fallacy of this formula. The author gives the formula NaWO_3 to the yellow bronze. In the preparation of tungsten bronzes, according to Wright's method, specimens were obtained differing in colour (especially reddish-yellow and purple preparations). All specimens, however, could be decomposed by ammoniacal silver solution with great ease, but on further investigation it was found that as the colour of the bronzes varied, so the quantities of separated silver differed. It was therefore supposed that similar compounds differing in composition must exist, and the present investigation was undertaken with a view of deciding this question. *Method of Analysis:* For the determination of the quantity of silver separated from the ammoniacal silver solution, the finely-pulverised substance was boiled with the latter for a short time. The resulting precipitate of silver being in a finely-divided state is apt to pass through the filter, and to avoid this a weak solution of ammonium nitrate with slight excess of ammonia is used for washing purposes. The silver is ignited and weighed. It is then dissolved in nitric acid, and the residue, consisting of tungstic acid (which is always present in the silver precipitate) is deducted. It was impracticable to determine the quantity of tungstic acid and sodium oxide in the filtrate, owing to the presence of silver. The following method gave satisfactory results: The finely-pulverised tungsten bronze is decomposed with a large excess of ammoniacal silver solution (for 1g. substance 2 to 2.5g. AgNO_3 was used). The ammonia is expelled, and a sufficiently large amount of nitric acid added, so that on boiling nearly the whole of the tungstic acid is precipitated. The precipitate is allowed to settle

for 12 hours, filtered, washed with weak nitric acid, and ignited. The silver is removed from the filtrate with hydrochloric acid, and the solution evaporated to dryness. The mass is moistened with ammonia, evaporated again, and taken up with hot hydrochloric acid, when a further (small) quantity of tungstic acid is obtained (a few milligrams). The sodium oxide is then determined as chloride. It is recommended, whenever sufficient material is at hand to determine the silver in one portion of the substance, and in another the tungstic acid and sodium oxide, in which case Woehler's method is preferable. The bronze is heated with sulphur in a covered crucible, and the resulting greyish-black mass decomposed by heating with aqua regia. The precipitate of tungstic acid is filtered, washed with dilute nitric acid, and ignited. For the analysis of blue bronzes it is necessary to heat the substance to 120° with ammoniacal silver solution in sealed tubes. In this case, if Woehler's method is used it is requisite to repeatedly fuse the substance with sulphur, the excess of which must be driven off after each fusion. *Preparation of the Bronzes by means of Tin:* According to Wright's method four different tungsten bronzes are produced, having a golden-yellow, reddish-yellow, purple, and blue colour. The first two always crystallise in the cubic form, the red compound in cubes (and also in furnace masses), and the blue variety in the form of prisms. Under similar conditions the yellow bronzes are obtained from mixtures containing small quantities of acid, and the purple and blue compounds from mixtures containing larger quantities of acid. However, the quantity of tin used and the time of fusion play an important part in the formation of the bronzes—e.g., strongly-acid mixtures in presence of much tin and by long-continued action give yellow bronzes, whilst salts containing less acid and fused with less tin, and for a shorter period, produce red and blue compounds. *The Yellow Bronzes* are obtained in a pure and well-crystallised form by fusing 2 mols. normal sodium tungstate with 1 mol. tungstic anhydride, and gradually adding tin (in the form of tin foil) the fusion being conducted for one or two hours. Thus yellow, and in some cases reddish-yellow, crystals are obtained. It was not possible to determine the conditions under which one or the other variety was produced. Analysis gave numbers agreeing with the formulae $\text{Na}_2\text{W}_2\text{O}_6$ (yellow), and $\text{Na}_2\text{W}_2\text{O}_6$ (reddish yellow). *Red Bronzes:* By fusing mixtures of 2 mols. Na_2O and 5 to 6 mols. WO_3 with tin a fine purple coloured bronze is obtained, which frequently contains yellow or blue admixtures, their colour depending on the quantity of tin used, and the time and temperature. It was found that by fusing together the following mixture (for $\frac{1}{2}$ to 1 hour) the purple bronze could be prepared in a pure state, free from all admixtures: (1) 12.6 g. Na_2CO_3 fused with 68.4 g. WO_3 (2 $\text{Na}_2\text{O} + 5\text{WO}_3$), and 20 g. tin foil. (2) 10.9 g. Na_2CO_3 fused with 71.7 g. (2 $\text{Na}_2\text{O} + 6\text{WO}_3$), and 20 g. tin foil, analysis gave the formula $\text{Na}_2\text{W}_2\text{O}_6$. *Blue Bronzes:* By fusing together mixtures of 1 mol. Na_2O with (more than) 3 mols. WO_3 and tin, and repeatedly lixiviating the fused mass with boiling hydrochloric acid and dilute soda ley, large masses of fine blue prismatic crystals are formed intermixed with red and yellow cubes. Analysis of a variety containing mere traces of admixture gave numbers corresponding with Scheibler's formula $\text{Na}_2\text{WO}_4 + 2\text{W}_2\text{O}_5$. *Preparation of Tungsten Bronzes by Reducing Sodium Tungstate with Hydrogen:* According to Woehler's original method larger yields are obtained than by reduction with tin. The bronzes, however, form smaller crystals. By reduction with hydrogen, all the above products may be prepared. From the mixture $\text{Na}_2\text{WO}_4 + \text{WO}_3$, the red and yellow bronzes are obtained. The red is formed when the gas is allowed to act at a low temperature and for a short time, the mass being extracted successively with water, hydrochloric acid, and sodium carbonate. The composition of the red product is identical with the red obtained by reduction with tin. The yellow product is obtained by increasing both time and temperature. In a similar manner the red and yellow bronzes may be prepared from acid sodium tungstate $\text{Na}_2\text{W}_2\text{O}_6$. By igniting the triacid salt $\text{Na}_2\text{W}_3\text{O}_{10}$ (prepared by fusing Na_2WO_4 with two mols. WO_3) in hydrogen gas, and dis-

solving in water a blue colour results. On continued heating, a red product is formed, and by over fusion the reddish-yellow variety is obtained. When anhydrous sodium metatungstate ($\text{Na}_2\text{W}_2\text{O}_7$) is used a similar result is produced. *Comparison of Tungsten Bronzes:* By decomposing sodium tungstates with tin, hydrogen, or the electric current reduction products are obtained, varying in composition in accordance with their colours. The following varieties have been prepared: (1) A pure golden-yellow compound ($\text{Na}_2\text{W}_2\text{O}_6$). (2) A reddish-yellow compound ($\text{Na}_2\text{W}_2\text{O}_6$). (3) A purple compound ($\text{Na}_2\text{W}_2\text{O}_6$). (4) A blue compound ($\text{Na}_2\text{W}_2\text{O}_6$). The tungsten bronzes are formed from acid sodium tungstates with loss of oxygen, for 2 atoms sodium 1 atom of oxygen is eliminated. The first two members of the group may be regarded as intermediate compounds between the product $\text{Na}_2\text{W}_2\text{O}_6$ (which has not yet been prepared), and $\text{Na}_2\text{W}_2\text{O}_6$. ($\text{Na}_2\text{W}_2\text{O}_6 + \text{O}_2 = 2\text{Na}_2\text{W}_2\text{O}_6 + 3\text{Na}_2\text{W}_2\text{O}_6$; $\text{Na}_2\text{W}_2\text{O}_6 = \text{Na}_2\text{W}_2\text{O}_6 + \text{Na}_2\text{W}_2\text{O}_6$). We should then have ($\text{Na}_2\text{W}_2\text{O}_6$) = $\text{Na}_2\text{WO}_4 + \text{WO}_3$; $\text{Na}_2\text{W}_2\text{O}_6 = \text{Na}_2\text{WO}_4 + \text{W}_2\text{O}_5$ and $\text{Na}_2\text{W}_2\text{O}_6 = \text{Na}_2\text{WO}_4 + \text{W}_2\text{O}_5$. The missing compound ($\text{Na}_2\text{W}_2\text{O}_6$) which probably exists has not yet been prepared in a pure state. In conclusion it is mentioned that by fusing the yellow or red bronzes with excessive acid sodium tungstate (e.g. the anhydrous salt $\text{Na}_2\text{W}_2\text{O}_7$) and excluding the air the blue compound is formed.—D. B.

Manufacture of Bronze. Henry Hussey Vivian, Park Wern, Swansea.

70 parts copper are melted in a plumbago pot and 30 of antimony gradually added. These form the antimony alloy hereafter mentioned. Then copper is melted and heated to boiling point, and tin and the antimony alloy added in the requisite proportions. The mixture is well stirred, boiled, and then cast in moulds dusted with resin.

Copper.	Tin.	Antimony.
93.8	3.95	.21
95.75	3.95	.70
85	13.70	1.30
83	15.50	1.50

are said to be good mixtures. The fourth is specially applicable for bearings.—W. P. T.

The Influence of Manganese on the Strength of Iron. Verhandlgn. d. Ver. z. Beförd. d. Gewerbelebens, 1881.

THE Institute for the Furtherance of Technical Industries has offered a prize of £100 on the following conditions: At least ten of the iron bars sent by each competitor should contain as a maximum '6 per cent. carbon and '4 per cent. of foreign constituents, whilst their manganese should increase by '5 per cent.; and ten other bars should contain as a maximum '6 per cent. impurities, whilst the carbon should increase by at least '15 per cent. with each bar, the bars to be 50 centim. in length by 40 millim. The analyses were made by Professor Finkener, and showed that none of the bars sent in were according to the terms of the competition. From this it follows that it is extremely difficult to obtain an alloy of desired composition, as the manganese is so easily oxidised. It was also found on turning and planing the bars that they contained many spots of different colour, which proved that the mixture of the different sorts of metal used for producing the alloy had been very imperfect. From experiments made on these bars by Spangenberg, it would appear that where great strength is required, the iron should not contain more than 3 per cent. of manganese; all the bars with more manganese tested below 78 kilos. per square centim. The best proportion seems to be about '5 per cent. carbon and '5 to '6 per cent. manganese. The section is reduced most at '6 per cent. carbon and '3 per cent. manganese. The highest modulus for elasticity is at '20 per cent. carbon and '24 per cent. manganese; the highest limit of elasticity at '43 per cent. carbon and 1.19 per cent. manganese. But for practical work it will be necessary to take the influence of other constituents, especially phosphorus, into consideration.—J. G.

Phosphor Bronze for Telegraph Wire. Elekt. Zeitsch. 1882, 83.

THE firm of Lazare Weiller, in Angoulême, have published a table as follows:—

Diameter.	Resistance on 1 km.	Weight.
0.8 mm.	18.317 S.E.	4.241 k.
1.0	62.915	6.625
1.3	37.259	11.232
1.5	27.904	14.914
1.8	19.119	21.156
2.0	15.728	25.511
2.5	10.003	41.429
3.0	6.959	59.638

The price at Avricourt for 1k. wire, 0.8 and 0.9mm. diameter, is 4 marks; 1.0 to 1.2mm., 3.60 marks; 1.3 to 1.9mm., 3.40 marks; and from 2.0 to 3.0mm. merely 3.20 marks. In *L'Electricien*, 1882, lvi. 2, 311, L. Weiller obtains from Mathiessen's formula $k = a - ct + ct^2$ for the dependence of the conductivity k on the temperature t , the temperature $t_0 = \frac{b}{2c}$, at which the minimum of

conductivity $k_0 = a - \frac{b^2}{4c}$ appears, and he points out that t_0 is a tolerably high temperature, and k_0 lies very near a . It is further added that from the present time the phosphor bronze furnished to each country will be so conditioned that the mean value of its conductivity at the mean temperature of the particular country will be realised.—W. S.

Extraction of Lead in the Blast Furnace and in the Cupola Furnace. C. Williger. Chem. Zeit. vi., 245.

THE Silesian blast furnaces yield as by-product argentiferous lead, besides other useful products. There were, in the year 1877, 28,144 centners obtained, in value about 756,299 marks; in 1878, 29,182 centners, value 645,988 marks; and in 1880 the Oberbergamt Breslau reported, as a by-product of six blast furnaces, 2,606 tons argentiferous lead. The melted lead is made to flow together, by a suitable contrivance, into a groove leading to the centre of the furnace, where it is kept fluid by a constant coal fire. For this purpose special circular systems of flues have recently been constructed known as the so-called Andrew's cross. The lead is from time to time drawn off, and thus some furnaces recover a quantity of 400 to 500 centners a month. The lead obtained contains, on an average, 25grm. silver, and in addition to that, as lately proved, so much gold that a separation will most probably be profitable. The lead is now subjected to another smelting in the iron works before it is sold to the silver-refining works.—E. B. S.

On the Electric Conductivity of Iron. Chem. Zeit. vi. 220.

ON this subject experiments have been recently made in Sweden, both with coarser and finer drawn rolled wire which had been ignited, also with wire which had not been drawn. A formula is given to calculate the conducting power of wire from its conducting resistance, its length, its absolute special weights; and a list of some kinds of iron differently prepared is recorded. From this it appears that the conducting power of iron is the greater the smaller the amount of carbon in it.—E. B. S.

Process for the Enamelling and Cementing of Metals, etc. E. J. Erichsen. Ger. Pat. 16304, June, 1881.

THE surface to be enamelled is cleaned, covered with silicate of soda, then with a mixture of silicate of soda and asbestos, to which lime or gypsum can be added, and finally strongly heated. In order to cover a boiler with this mixture, it is surrounded with a wooden jacket, and the space between, which is about 5cm. wide, is tightly packed with asbestos and silicate of soda. The inside of the boiler, after cleaning with dilute sulphuric acid, should also be covered with this mixture. The above mixture can also be used as a cement.—M. J. L.

Electroplating with Platinum and Silver. Milton H. Campbell. U.S. Pat., Jan. 31, 1882.

30 parts of platinum and 70 parts of silver are dissolved in nitro-muriatic acid, and precipitated as a grey powder by chloride of ammonium. The resulting compound chloride is dissolved in cyanide of potassium and water. This forms the electrolyte. The anode is an alloy of 30 platinum and 70 silver. A feeble current is used. Claims that the electro-plated surface will stand the action of nitric acid and the sulphides.—W. P. T.

Manufacture of Alloys of Tungsten and Iron, Chromium and Iron, and of Phosphate of Copper. Lucien Guetat and Tréonée Chavanne, Paris, France. French Patent.

THIS invention consists essentially in taking the soluble salts of the required metals, or bichloride of copper and phosphate of lime, in the proportions required to form the alloy (or phosphate of copper), and precipitating them by double decomposition as chromate or tungstate of iron (or phosphate of copper). These are dried, roasted, mixed with carbon, and heated in well-luted crucibles.—W. P. T.

Refining Copper. Claude T. J. Vautin, New Fitzroy, Victoria (a communication to H. H. Lake, London). Eng. Pat. 5589, 1881.

THE inventor either blows air through the melted copper or rables in oxide of copper and lime, or other oxygen-producing material, and a flux. If bismuth be present chlorine or HCl is blown through, or chloride of sodium and slacked lime is rabled in.—W. P. T.

Metallic Alloy. Carl H. Kuhne, Loebtau, Saxony (communicated to W. L. Wise, London). Eng. Pat. 2200, May 24, 1881.

THIS alloy consists of 83½ parts copper, 7 tin, 9 lead, 1 phosphorus (100). It is claimed as good for bearings and valves.—W. P. T.

FATS, OILS, AND SOAP MANUFACTURES.

Mottled Marseilles Soap has hitherto been supposed to be invariably genuine. A. Boliessé publishes, however, an analysis of a specimen of Mottled Marseilles Soap which was found to contain 11.7 % of talc. (*Seifenfabr.* p. 239.) O. N. W.

A good Ox-gall Soap may be prepared, according to the prescriptions of the *Muster Zeitung*, by mixing together 1½ kilos. ox-gall with 25 kilos. melted cocoa-nut oil. This mixture is saponified by the cold process with 12½ kilos. caustic soda ley of 38° B. This soap may be dyed by the addition of 650 grms. ultramarine, and perfumed with a mixture of 75grms. lavender oil, and 75 grms. camay seed oil.—O. N. W.

Manufacture of a Light Curd Soap. A. Osterberg-Gräber. Ger. Pat. Kl. 23, No. 10480, April, 1881.

210 kilos. cocoanut oil, 15 kilos. purified palm oil, 23 kilos. resin, 50 kilos. olive oil, and 60 kilos. tallow, are boiled with 180 kilos. of caustic ley, added in quantities of varying strength, beginning with a weak solution until the strength of the ley reaches 40° B. As soon as a glue-like mass is formed, 200 kilos. Semen Payllii (Eucalyptus) are mixed with the mass, and boiled until the soap looses itself from the sides of the vessel as a pasty mass, which is perfumed according to requirement. Shortly before pouring it out, some finely-divided bicarbonate of soda is added. The carbon dioxide set free forces itself through the soap, and causes hollow spaces to be formed. The specific gravity of the soap is thus lessened, so that it swims on water. M. J. L.

Fat Rendering Apparatus. Geo. Boyha, St. Louis, Miss. U.S. Pat. 254103.

THIS invention consists essentially in covering over the rendering apparatus with a conical roof, and causing all the exit ventilation to take place through a small furnace flue at the apex of the roof, where the objectionable effluvia is burned before escaping into the atmosphere.—W. P. T.

Method and Apparatus for Rendering and Bleaching Animal Fat. Garret Cosine, of New York. U. S. Patent 254279, February 28th, 1882.

THE previously-communicated fat falls through the heated atmosphere of a steam-jacketed vertical cylinder through a series of screens. The screens separate the membranous matters and divide up the fat, exposing it to the influence of the hot air. The liquid fat runs off from the bottom of the cylinder to an agitator, where it is agitated with bleaching agents.—W. P. T.

Process and Apparatus for Extracting Fat from Bones by using Volatile Solvents and Steam at Low Pressure. A. Leuner. Ger. Pat. 17181, March, 1881.

ACCORDING to this process the bones are first treated in A with direct steam from the pipe b, in order to prepare them for the subsequent extraction. This takes place first, with the cock p open to drive out air, later on with the apparatus completely closed. Now about equal volumes of petroleum spirit and water, contained in the reservoir B, are passed in under the perforated false bottom a. The underlayer of water is now heated by the steam-coil c. In A the vapours of petroleum-naphtha and water collect, the steam assists the solvent action of the naphtha, and completes the formation of glue. In the condenser D are two cooling-worms, m m' and o o'. At first m m' is used, the tube n being closed,

so that the vapours from A pass through the tube s into the receiver C and reversed condenser m m', and the condensed liquid runs back to A, where falling upon the perforated plate y it is distributed, and so trickles down amongst the bones. The uncondensed vapours enter G I under water, into B, and the vapours formed in B are held back as much as possible by the small reversed condenser E. Now the worm o o' is used, the tube s being closed, and the tubes t and n being open, so that now the condensed distillate flows to B. When the distillate only consists of water, the extraction is finished. The fat found in A with water is run off, and then the bones are deprived of gelatin in the usual manner.

W. S.

Use of Guttapercha Paper instead of Parchment Paper in the Osmosis of Solutions of Glycerine. H. Fleming. Ger. Pat. 17547, April, 1881.

IN the separation of glycerine from saline solutions by osmosis, the diffusion of the glycerine may be obviated by replacing the ordinary parchment paper by a guttapercha membrane, which is proof to the passage of glycerine. The guttapercha paper is applicable to numerous other processes of osmotic analysis.—C. F. C.

Separating Glycerine from Spent Soap Leys. Fr. Jos. O'Farrell, Dublin. Eng. Pat. 2394, July 27, 1881.

THE ley is evaporated to the point of saturation of chloride of sodium, and used again to precipitate fresh soap. This is repeated till the ley is very rich in glycerine. The solution is now evaporated till all the salt crystallises out, it is then distilled in vacuo with a steam jet at about 200° C. The distillate is heated a second time with low surface heat only to separate the water as steam.

W. P. T.

Manufacture of Pure Oil for Pharmaceutical Purposes. Isaac Gottlieb, Vienna (communicated to W. P. Thompson, Liverpool and London). Eng. Pat. 3542, August 16, 1881.

ONE HUNDRED parts of raw mineral oil, specific gravity 0.85 to 0.95 are repeatedly digested with 10 to 40 of sulphuric acid, and allowed to settle, and after each digestion skimmed off. This purified oil is treated in a heated state with the powder forming the residue in the production of yellow prussiate of potash.—W. P. T.

Process for Recovering the Glycerine from the Leys of Soap Manufacture. H. Fleming, Kalk, near Cologne. Ger. Pat. 13953, December, 1880.

THE patentee proposes to subject the leys to dialysis. In an article in the *Seifenfabrikant*, 1881, he points out that four works in the town of Newwid alone run to waste about 1,500 tons of ley per annum, which contain 75 tons of glycerine, worth about £7500. Leys contain between 72 and 7.8 % of glycerine. Before being able to recover the latter it is necessary to remove the sodium chloride, which is best done by osmosis. The leys are first evaporated by steam until the liquor contains at least 20 % of glycerine. It is then neutralised with sulphuric acid. The quantity of the acid required varies much, as the liquors contain from 1.9 to 12.9 % of sodium carbonate. Where soda ash has been used instead of sodium chloride for the purpose of salting out, as much as 31 % of alkali has been found in the ley after evaporation. It is advisable to use a slight excess of sulphuric acid, to let afterwards the liquors stand to crystallise, and then to neutralise them with lime; after settling they are evaporated further. They should now contain no less than 40 % of glycerine, but may contain as much as 66 %. The specific gravity is about 1.28; the ashes about 13 to 16 %. At this stage the cost of one kilo. of glycerine is about 3.6d. The liquor is now ready for osmosis, by which process the ashes it contains are so far reduced that after further evaporation it can be distilled either by itself or with crude glycerine from stearine works. The loss on distilling is small, and the product pure enough for dynamite works. When evaporated to 1.26 specific gravity, and therefore free from water, it contains no sodium chloride. The leys do not attack the parchment paper, as they contain no lime compounds, the paper having been found in good condition after six months' usage. The patentee calculates the cost of 1 kilo. of 60 % glycerine at 6d. The water of osmosis contains a considerable quantity of glycerine. In one experiment 1,400 kilos. of the water gave 23 kilos. liquor containing 16 kilos. glycerine, at a cost of about 6d. per kilo. This product, contaminated with salt, and therefore not as pure as that obtained in stearine works, was still found as pure as a common Dutch glycerine of 63 % which cost 2.2s. per kilo. In the patentee's opinion, the proposal of using only fatty acids in soap-making, and of decomposing the fats for that purpose in an autoclave, promises but little success.—J. G.

Manufacture of Curl Soap. J. Weineck. Ger. Pat. 16350, March 1881.

A CERTAIN quantity of fat is brought to melting in a cylindrically-shaped vessel, standing in another one filled with water, and mixed with a 20 per cent. soap solution to form an emulsion. The soap is then quickly formed on the addition of the caustic ley. The ley, under the soap formed, contains caustic soda and glycerine.—M. J. L.

TANNING, LEATHER, GLUE, SIZES, AND RESINS.

Sources of Caoutchouc. Dingl. Polyt. Jour., 243 [5], 434.

ACCORDING to C. R. Markham, in Gehe's *Handelsbericht*, September, 1881, the best caoutchouc-producing trees now grow in Ceylon, Burmah, and in the neighbourhood of Calcutta and Madras, e.g., *Ficus elastica* of India, *Castilloa elastica* and *Castilloa Marhamiana* from Central America, which yield oleo-caoutchouc; *Siphonia elastica* from the Amazon, which yields para-caoutchouc; and *Munhot Glaziovii*, also from the Amazon, which yields ceara-caoutchouc. This last plant was only discovered by Cross when he was engaged in the transportation of the material from South America. The trees are first cut in the twenty-fifth year of their growth, and this operation is only repeated every three or four years.—M. J. L.

A New Process of Quick Tanning. C. Pavasi. Chem. Zeit. vi., 245.

HAVING continued his experiments, the author has succeeded in improving the process. He now proposes to use ferric acetate as tanning material instead of ferric chloride or sulphate, which makes the leather somewhat hard and imparts a reddish-yellow colour to it. Another method consists in acidifying the water used for the extraction of tannin with wood vinegar; and from such water the prepared leather extracts the tannin rapidly. The process lasts two to three months.—E. B. S.

Treating Hides. John M. and George Ordway, Boston. U.S. Pat. 253320, Mar. 21, 1882.

THE hides are steeped in a nearly saturated cold solution of chromic acid till thoroughly permeated, then exposed to sunlight.—W. P. T.

Tanning. Geo. L. Loversidge, Rochdale. Eng. Pat. 3740, Aug. 27, 1881.

THE hides are treated with valonia, oak bark, borax, or boracic acid and citric acid, with frequent handling and constantly increasing amounts of tanning material, the solution as regards boracic and citric acids being kept about constant in strength.—W. P. T.

SUGAR, GUMS, STARCHES, ETC.

Körting's Injector for Forcing Carbonic and Sulphurous Acids through Sugar Liquors, etc. Journ. d. Fab. d. Sucre, No. 10, 1882.

THE injectors of Körting's system have many advantages over ordinary pumps, as their cost is small and they may be set up in a few hours without expensive foundations. As sulphurous acid has lately been much used in sugar-houses, and has been found to exercise a very favourable influence in the purification of saccharine products, Messrs. Körting Bros. have applied the experience gained in the application of sulphurous acid to various industries to the construction of a very simple arrangement which combines all the required conditions. This apparatus consists, in the first place, of an aspirator constructed so as to produce a rarefaction of the air under the influence of a jet of steam escaping from a very narrow orifice. A draught is thus produced which draws a current of air through the grate containing burning

sulphur. The sulphurous acid formed passes by a tube to the aspirator, where it mixes with the jet of steam and is forced to the saturating pan by being cooled in the condenser, at the bottom of which is a chamber where any sulphur or other matter is retained. The sulphurous acid, cooled and purified, arrives at the principal pipe which is connected to the perforated worm of the saturating pan by a caoutchouc tube furnished with a pinchcock for regulating the supply of the gas. The cleaning of the apparatus is facilitated by the arrangement of the pipes and joints. The parts liable to be attacked are of lead, and the small tubes of the aspirator are renewed from time to time in a few minutes at a small cost. The jet of steam is regulated by a screw, which during work should be full open. These injectors may also be used to replace or supplement the vacuum pumps used for the double or triple effect. The same apparatus gives good results in refineries, when used for sucking the syrup from leaves.—A. W.

The Cultivation of the Sugar Beet. Journ. d. Fab. d. Sucre, No. 11, 1882.

DEMMUNFACT considers that the discordances between the cultivators situated in the different departments, upon the commercial value of the different varieties of sugar beet, is sufficiently explained by the difference in the soils and climates, if the exposure of the ground and the meteorological and agricultural chances do not render them natural and necessary. To establish a standard of saccharine richness applicable to all soils, climates, and years, therefore, appears to him impossible. Dr. J. Fülling, professor in the University of Heidelberg, an authority on the cultivation of the beet, agrees with Achard, Duhrnant, and others, in recommending the white beet of Silesia, and remarks: "Of our materials it almost always results that the enormous influence of the cultivation, and of the selection made by the cultivator himself, manifests itself, in many cases, the beets thus selected have given the best results in the corresponding locality. Each cultivator should, then, as much as possible, produce his own seed."—A. W.

Decomposition of Grape Sugar and Uric Acid by Alkalies, at the Temperature of Incubation. M. Nencki and N. Sieber. Journ. Prakt. Chemie. N.F. xxiv., 498.

IF grape sugar, mixed with ten times its weight of water and double that of potassium hydrate, be exposed for 24 hours to a temperature of 35° to 40° C., nearly half of it is converted into *D*-lactic acid. An acid, soluble in alcohol and insoluble in ether, is formed at the same time, but has not been further investigated. Uric acid yields, under similar conditions, first, murexanic acid, and, on prolonged digestion, its products of decomposition—carbonic anhydride, urea, etc.; and, finally, ammonium carbonate and oxalate.—F. H. and H. S.

Improvements in Refining and Crystallising Starch Sugar. Franz Soxhlet, Munich.

COMMERCIAL starch sugar is melted and mixed with from 70 to 80 per cent. (weight) of alcohol, 80°, or with pure wood-spirit. To the syrupy mixture powdered starch sugar is added, and the whole left to solidify at a temperature above 30°, while being stirred frequently. In the same way the syrup may be treated, obtained in the manufacture of starch. The alcohol is recovered by distilling in a vacuum the alcoholic liquor pressed out of the crystalline mass. Solid transparent starch sugar (hydrated dextrose, $C_6H_{12}O_6 \cdot H_2O$) is prepared by concentrating starch sugar solution in a vacuum to 46° B. (weighed at 90°), and letting it solidify at a temperature above 35°.—F. M.

Bleaching Sugar. James Duncan, Mincing Lane, London. Eng. Pat. 3103, Aug. 3, 1881.

CHLORINE is passed through the sugar to bleach it, and the taste removed by passing first air and then alcohol through the bleached mass.—W. P. T.

Treating Refuse of Starch, etc. Edwin Root, Buffalo, N.Y. U.S. Pat. 254240, Feb. 28, 1882.

THIS consists in subjecting the husks, etc., to pressure under elastic rollers, as in paper making, to separate the water, then in a press, then disintegrating and drying in suitable drying mechanism, so as to make the material a useful food for cattle.—W. P. T.

Apparatus for Washing Starch. Edwin Root, Buffalo, N.Y. U.S. Pat. 254157, Feb. 28, 1882.

THIS consists of a cylindrical or slightly conical tank and a vertically adjustable screw propeller wheel, or other agitating device, which may be moved up and down by rack and pinion, or other device, without interfering with the rotary motion of the stirrer.—W. P. T.

Separating Starch from Starch Water. Edwin Root, Buffalo, N.Y. U.S. Pat. 254239, Feb. 28, 1882.

THE starch water is continuously let into a tank having a conical bottom, just above the cone, at several different points round the circumference, the starch subsides, and is occasionally drawn out at the bottom of the cone. The water overflows at the top of the tank.—W. P. T.

Starch Machinery. Edwin Root, Buffalo, N.Y. U.S. Pat. 254158, Feb. 28, 1882.

THE starch is conveyed from the settling tanks to where it is required on belts passing over concave rollers, said belts forming also the bottoms of shallow stationary troughs, whose sides prevent the starch still further from falling off the belts in transit. The concave rollers, etc., are suspended from the ceiling.—W. P. T.

Method of and Apparatus for the Production of Refined Sugar in Plates, Sticks, and other like Forms. Moriz Weinrich, Vienna. U.S. Pat. 255359.

THE box, which is subdivided into a series of compartments containing the sugar, is placed on adjustable rails, so that when the sugar is set and its bottom removed it can be lowered, and the green syrup removed into the pan beneath, on top of which is a series of laths to prevent the sugar plates falling out of the box.—W. P. T.

Method and Apparatus for Bleaching Cane-juice, Syrup, etc., with Sulphurous Acid. Ambrose G. Fell, New York. U.S. Pat. 254471, March 7, 1882.

THE sulphurous acid is produced under pressure by forcing air into a revolving cylinder in which sulphur is burning (thus exposing a large and thin area of sulphur). The compressed gas is then forced into closed vessels containing the syrup, where the pressure is allowed to accumulate, the liquid being thoroughly agitated by a stirrer. The gas manufactured in this way can also be stored up in reservoirs, as no pumps are required, and as all the operations are conducted in closed vessels there is no escape of gas to annoy the workman.—W. P. T.

Method of Refining and Purifying Sugar. Bernard H. Rammels and John Williamson, Glasgow, Scotland. U.S. Pat. 255021, March 14, 1882.

THIS is designed to obviate the inconveniences at present attending the filtration of raw cane and beet sugar, owing to the large quantity of gum, or mucilage, which they contain, and which quickly chokes up the filtering medium. It consists in adding finely-pulverised vegetable charcoal, which absorbs the gum and a portion of the colouring matter. The residues then collect in the filter bags as solid lumps or cakes, from which the charcoal and sugar can be easily recovered.—W. P. T.

Preparation of Crystal Sugar and Pure Syrup from Beetroots and other Saccharine Substances. E. A. Schott, Kreiensen. Ger. Pat. 17407, Feb. 17, 1881.

IMMEDIATELY after being cut, and previous to being pressed, the slices of beetroots are purified by extracting them with cold water, which takes up foreign substances, chiefly colouring matters. The juice is obtained by boiling the slices treated in this way in water until they have become transparent and the water is nearly evaporated. The juice, together with the slices, is then put on a cloth spread over a frame, and the sugar is extracted from them by placing the latter over a vessel with boiling water so that the slices are just covered. By changing the water repeatedly, the sugar can be completely extracted from the slices. From the solution obtained, the gummy substances are first separated by the addition of lime, whereupon the sugar-line solution is decomposed by carbonic acid and then completely neutralised with sulphurous or sulphuric acid. After the separation of a double-salt of calcium sulphate and potassium sulphate, by further concentration, the liquor is filtered. From the filtrate the sugar readily crystallises out. Alcohol may be substituted for lime in separating the glutinous matters, or the latter may be got rid of by a diffusion process. The mucilage of the gummy substances, after being neutralised with an acid, can be employed in the paper and textile manufactures. The process described is also applicable to the manufacture of crystal sugar from the treacle obtained in the manufacture of sugar by the usual processes.—F. M.

AGRICULTURE, MANURES, &c.

On the Employment of Superphosphates for the Calcareous Soils of the South-East of France. M. De Gasparin. Compt. Rend. xiv. (12), March 20, 1882.

IN districts not subject to violent rains or floods, superphosphates may be used to great advantage. From 700 to 800 kilogrammes per hectare spread quickly, and followed by gentle rain or a deposition of dew increase the fertility in a measure which more than compensates for the expense of the fertiliser. The author gives the results of some analyses of superphosphates and natural phosphates, and includes, *inter alia*, that the beneficial effect of these artificial manures is due to the tri-hydrogen phosphate which under the influence of superficial moisture is rapidly and uniformly disseminated through the soil.—A.S.

BREWING, WINES, SPIRITS, ETC.

Detection of Bordeaux-Red in Wine. C. Thomas. Chem. Zeit. vi., 244.

A METHOD of detecting the above sulphonic acid has been modified by the author as follows: 100 c.c. of wine are precipitated by barium hydrate, filtered from barium sulphate; the excess of barium is removed by ammonium carbonate. The liquid is, after some hours, filtered, evaporated to dryness, the residue ignited to complete decomposition of the organic matter, dissolved in dilute hydrochloric acid, and, after filtering, tested for sulphuric acid with barium chloride. Even 0.5 g. Bordeaux-red in 1 litre of wine can be detected in this manner.—E. B. S.

Testing of Brandy for Purity from Fuel Oil. Alexander Müller. Repert. d. Analyt. Chem. ii., 76.

THE author proposes to use as a standard for testing the purity of brandy, a mixture of 999 volumes of 40 per cent. alcohol at 15°C. with one volume of pure amyl alcohol. By comparing the intensity of colour which sulphuric acid imparts to a certain small quantity (5 c.c.) of this standard, and also to the same volume of the distillate of the given liquid, one can recognise whether the sample of brandy is more or less pure than the above normal fluid. The author would only have such brandy legally admitted as contains no more than 0.1 volume per cent. amyl alcohol. This method is only applicable for brandy which contains no volatile ingredients besides ethyl and amyl alcohol.—E. B. S.

Estimation and Detection of Sulphuric Acid in Wine and other fluids. C. Liebermann. *Ber. Berichte* xv., 439.

ABOUT 15 to 20 c.c. of the wine is distilled off. The distillate is mixed with an equal quantity of water, treated with a few drops of iodine solution, and shaken up with a few drops of chloroform. If the liquid contains sulphurous acid, the chloroform assumes a violet colour; if larger quantities of sulphurous acid are present, the liquid is coloured yellowish-brown by the mere addition of iodine solution. The author finds that in 2 c.c. of a solution containing in 500,000 parts one part of sulphurous acid, the presence of the latter can be clearly established. His experiments further tend to show that volatile organic substances, e.g., acids and aldehydes, cannot reduce hydriodic acid under similar conditions, hence the following method is recommended. The wine is distilled carefully in a small flask until all alcohol has been expelled, if a quantitative determination is made. The distillate is diluted with water, treated with some hydrochloric acid and barium chloride, to ascertain whether sulphuric acid has been carried over mechanically. The liquid (if clear) is treated with a small quantity of nitric acid (conc.) and heated gently in a corked flask. If the quantity of sulphurous acid is at all large the liquid immediately becomes turbid. If smaller quantities are present the turbidity forms on standing. For detecting sulphurous acid in wine the reaction of Fordan and Gélis is largely adopted. It is, however, recommended to use sodium amalgam and hydrochloric acid, in place of zinc and hydrochloric acid, as zinc often contains sulphur. Attention is also drawn to the fact that as sulphuretted hydrogen gives the same reaction, the liquid must always be tested for the presence of this gas. It suffices to pour the distillate into an alkaline solution of sodium nitroferrocyanide.—D. B.

Detection of Sulphurous Acid in Wines. Leo Liebermann. *Ber. Ber.* xv., 439.

THE author gives two methods: (1) 15 to 20 c.c. are distilled from a larger quantity of wine. To the distillate, diluted with an equal bulk of water, a few drops of iodine acid are added and agitated with a few drops of chloroform. If the liquid contains sulphurous acid this liberates iodine, which colours the chloroform. Two cubic-centimetres of a solution of 1 sulphurous acid in 500,000 are sufficient for reaction. (2) Wine is carefully distilled. To the distillate hydrochloric acid and barium chloride are added, and the clear solution, on being treated with nitric acid will become turbid if sulphurous acid is present in the wine. It must be borne in mind that as sulphuretted hydrogen will give similar reactions.—F. H.

Manganese in Wines. E. Ostermayer. *Ber. Ber.* xv., 542. THE author finds from 4 to 5 mgr. of manganese sulphate per litre in every natural wine, while artificial wines always contained less.—F. H.

A New Breiwing Process. F. W. Leykauf, Mörgelsdorf, Bavaria. *Ger. Pat.* No. 16452, 14th May, 1881.

THE mashing is done in water of 50°. The mash after having been worked through for 5 minutes is left to stand for 10 minutes, whereupon the liquid standing over it is transferred to the clearing tub. To every hectolitre 4 kilo. of scalded hops and from 15 to 17 grms. of calcium carbonate are added. The thick mash remaining in the boiler is heated to 60°, then to 77°, and after saccharification boiled for an hour with the addition of 80 grms. of calcium carbonate for 100 hectolitres of mash. The liquid first taken off is then added again to the thick mash. After a quarter of an hour the wort is pumped into the pan. The wort and the hops are boiled separately for 2 hours, then both of them are cooled down to 85°, and the latter added to the first. During the operation of cooling, from 60 to 80 grms. of calcium carbonate are added for every 100 hectolitres. In order to prevent the fermentation and decomposition of the albuminous substances, an addition of 15 grms. of magnesia is made to every litre of yeast.—F. M.

Apparatus for Malting Cereals. Julien Purviez New York. U.S. Pat. 254374, Feb. 28, 1882.

THE floor of the malt chamber is constructed of alternate strips of wood and perforated metal. At one end is the chimney, at the other an air-refreshing and moistening chamber in which the air is saturated with moisture by means of spray and wet sponges. The air passes by numerous orifices from the air-moistening chamber to the malting chamber, and thence through the malt and floor to the chimney.—W. P. T.

Preparing a Combined Extract of Hops and Malt for Brewing. S. R. Percy and W. S. Wells, New York. U.S. Pat. 254565, Mar. 7, 1882.

100 lb. of malt and hops are digested with 1 gal. alcohol, 1 gal. glycerine, and 1 lb. of bicarbonate of soda, in a vacuum pan provided with an agitator and steam jacket—the hops and malt repeatedly digested with fresh solvent till quite exhausted. The extract is evaporated with molasses.—W. P. T.

Method and Apparatus for Manufacturing Distilled Spirits from Grain. William T. Jebb, Buffalo, New York. U.S. Pat. 254330, Feb. 28, 1882.

THE grain is moistened, reduced in a grinding mill, the starchy portion and bran separated and taken to separate receivers; the starchy portions are mashed, fermented, and distilled in the usual way; the bran and other coarse offal are reground, mashed, fermented, and distilled separately, and thus an inferior spirit obtained from them.—W. P. T.

Washing Malt and Malt Substitutes. George Seitz New York. U.S. Pat. 255203, Mar. 21, 1882.

THE malt is first steeped in lukewarm water under agitation, and allowed to stand for an hour or so. Then some of it is mixed with a quantity of raw unmalted grain, and the mixture under continual stirring is subjected to a boiling temperature at atmospheric pressure in a steam-jacketted saccharification vessel, having interior stirring mechanism. It is then drawn off into a kettle with stirring mechanism, and the unboiled portion of the original mash added and mixed. The whole is then reduced below saccharification temperature, then heated to 160°F., and finally conducted off into a tun below, provided with a perforated false bottom, where it is drained.—W. P. T.

GLASS, POTTERY, ETC.

Glass Furnaces. Joshua W. Houchin and Joshua R. Houchin, Brooklyn, New York. U.S. Pat. 254653 and 254654.

THESE consist (1) in a furnace for melting glass in pots; (2) for a tank furnace in which liquid fuel is used. The liquid fluid is introduced by means of an air-blast atomiser into a combustion chamber separated from the furnace by a bridge or dam; another air-blast blows over the dam into the furnace, carrying the flame with it. The pot furnace is arranged for four pots and two working holes for each pot.—W. P. T.

Apparatus for Annealing and Tempering Glass. Jos. H. Campbell, New York. U.S. Pat. 254272, Feb. 28, 1882.

THE glass is placed in a chamber, and a hot mixture of CO and N, from a deep coke fire, passed over them for a sufficient time and in the direction of their length. This the inventor states will cause the crystallisation to be polarised in the same direction. The articles are then slowly cooled with CO₂ and N₂ formed by the burning of the previous gas, the current being in the reverse direction, those articles which expand in cooling being cooled in compressed gas, and those that contract in cooling being treated with a partial vacuum.—W. P. T.

TEXTILES.

Hydrocellulose. Girard. *Repert. der Analyt. Chem.* ii. 91.

THE cellulose substances undergo, under manifold circumstances, a remarkable change, which frequently causes much injury and annoyance both to the manufacturer and in common life. It is a fact that cellulose, under certain influences, loses its natural flexibility and suppleness and becomes brittle and may easily be reduced to a powder. For example, certain fabrics of vegetable origin, such as linen or cotton tissues, wall papers, parchment papers, etc., unexpectedly break up or fall to pieces as if they were rotten, especially if their bleaching had been badly conducted or if they had otherwise been imperfectly prepared. As a striking case in household matters we know that, especially in large towns, the linen which had been repeatedly subjected to bleaching loses all its strength and becomes brittle. Window-curtains or similar vegetable tissues yield to the slightest force, seemingly without any chemical agency. All those who have to deal with acids are well aware of their destructive action upon the fibres of cloths, papers, etc. This latter fact has led several eminent chemists to explain the change of the physical condition of cellulose by assuming acid or acid salts to be formed in the tissue, and this has in some cases actually been proved, as, e.g., by the oxidation of sulphuretted hydrogen to sulphuric acid. But in this way the change cannot be accounted for in all cases. The author has therefore sought for the causes of this important change and its results. He believes to have settled that, whatever may be the circumstances under which the cellulose is changed, there is only one cause to which that conversion must be ascribed, and there is always one and the same substance produced: either by the action of acids or by a variable temperature, or time, the cellulose, $C_6H_{10}O_5$, before passing into sugar, or even only its soluble modification, undergoes hydration and becomes a new compound, hydrocellulose ($C_6H_{11}O_{11}$). This possesses definite, sharply-marked properties, in the first instance an absolute brittleness, but it also shares many of the characteristics of ordinary cellulose, and, like this, gives explosive nitro-compounds.—E. B. S.

Artificial Ivory or Celluloid. F. W. Cottrell, London. Eng. Pat. 3376, 1881.

ANY form of cellulose is the basis. Sulphuric acid, specific gravity 1.84 to 1.85 (75 parts), is placed in a receiver, with 25 parts commercial nitrous acid; a saturated solution of peroxide of nitrogen in nitric acid, specific gravity 1.420, is retorted a little below 132° F., the fumes passing into the sulphuric acid until it is saturated by them. The cellulose is immersed in this acid, 1 lb. of cellulose to the gallon, then taken out and left to stand an hour, then thoroughly washed and dissolved in alcohol (specific gravity 0.920) 75 parts, and coal oil 25 parts, in the proportion of 1 lb. solvent to 1 lb. fibre.—W. P. T.

DISINFECTANTS, FILTERING, ETC.

Deodorizing and Disinfecting Agent. R. E. Goolden and Angus Mackay, both of Southwark. Eng. Pat. 2386, 1881.

THIS consists essentially in the use of gum kauri. This, combined with grease or oil, is burnt in candles or lamps. It is saponified to make disinfecting soap, or dissolved in alcohol and used in a spray form, or burned.—W. P. T.

Treating Cordage and Twine for Binding Sheaves of Grain. Smith A. Skinner, Hoosack Falls, New York. U.S. Pat. 255040, Mar. 14, 1882.

IN the harvest field, etc., cord or twine is liable to attacks of mice or insects and rot. To preserve from the former it is soaked in sulphate of zinc or other poison, and to protect from rot and make it more supple it is saturated with a paraffin, vaseline, coal-tar, or other hydrocarbon.—W. P. T.

PRESERVING FOOD, MEATS, Etc.

Preserved Condensed Milk, and a Comparison of the Swiss Product with the American one without Sugar. N. Gerber. *Repert. der Analyt. Chem.* ii., 68.

MILK, one of the most excellent of alimentary substances, is, by its frequent adulterations, as well as the enormously high price for a genuine article, placed too far beyond the reach of all classes of society. A great blessing, especially for large towns, would be conferred if preserved condensed milk without sugar and chemicals could be made available, not only to the wealthier, but also to the needier classes of society. The preserved milks of the present day are all too dear, and are not an appropriate form of nourishment for the poorer classes. Comparing the two chief condensed milks—the Swiss milk manufactured with the addition of sugar, and the American one without this ingredient—the author draws, from accurate statements and analyses, the following conclusion: American condensed milk does not keep, and often in summer curdles, even after the first day. Swiss milk exposed to the air keeps some days, and in closed vessels remains good a very long time, if well condensed and preserved. In price the latter would hardly be able to compete with the American marks, as these are sold in New York at 25 to 28 cents. per quart, the former one, however, at about a dollar for the same quantity.—E. B. S.

EXPLOSIVES.

Manufacture and Application of Nitrogen Tetraoxide or Peroxide of Nitrogen.

THIS is produced by decomposing nitrate of lead by heat, and the fumes condensed in a refrigerating machine. The liquid, mixed with carbon bisulphide in equal proportions, is stated to equal nitroglycerine in explosive qualities when confined. Burnt in free air, the mixture gives a very brilliant light, stated to be equal to the Drummond light, and a heat sufficient to melt its own weight of platinum, or instantly fuse iron. To make the light still more brilliant, phosphorus can be dissolved in the OS_2 . The mixture then takes fire spontaneously.—W. P. T.

Explosive Compound. Silas R. Devine, Lock, She¹-drake, N.Y. (Communicated to H. H. Lake, London.)

3 to 4 of a solid oxidising ingredient, such as chlorate of potash, is mechanically combined with 1 part of a liquid ingredient, such as nitrobenzol.—W. P. T.

FINE CHEMICALS, ALKALOIDS, ESSENCES, ETC.

Researches on Atropine. L. Pesci, Ber. Deutsch. Chem. Gesellsch. xv., 520.

THE action of nitric acid on atropine produces an alkaloid apotropine, which contains one molecule of water less than atropine. It crystallises in colourless prisms, which melt at 60 to 62° C., and are differently soluble in water, slightly in benzine and amylalcohol, easily in alcohol, chloroform, benzole, and carbon bisulphide. A number of salts of this alkaloid have been prepared. Apotropine is supposed to be

and yields, on heating with fuming hydrochloric acid to 120–130° in a sealed tube, tropine isotropic acid (fusing point 196–198°), and atropic acid (104–100° fusing point). Apotropine does not act on the pupil, decreases the pulse, and produces characteristic convulsions when given in larger doses. Hydnatropine has also been prepared by means of nascent hydrogen. It is an oil of the following composition—

On the Essence of Licari Kanali. M. H. Morin.
Compt. Rend. 94 (ii.), March 13th, 1882.

By the action of fused zinc chloride and hydrochloric acid on the essence of Licari Kanali, this essence (with the formula $C_{23}H_{14}O_2$) may be shown to behave as a hydrate ($C_{23}H_{14}(OH)_2$) of a peculiar hydrocarbon licarene ($C_{23}H_{14}$), which is isomeric with terebenthene. Details of the action of the above reagents on the essence, and analysis, are given in the paper.—A. S.

Manufacture of Sulphur, Phosphorus, Arsenic, and Iodine from Gases containing combinations of these substances, and the Decomposition of Firedamp and other Gases. (A Communication from Charles Gerard and J. A. Palst, of Paris, to Wm. Clark, of London). Eng. Pat. 3584, August 17th, 1881.

THE gases are passed up Gay-Lussac towers containing coke saturated with nitrosulphuric acid, or the crystals from lead chambers dissolved in H_2SO_4 . Phosphorus, sulphur, arsenic, and iodine are, it is stated, deposited, and firedamp and other gases decomposed, so as no longer to be explosive with oxygen.—W. P. T.

Distilling Alcohol. K. Trobach and Alfred Cordis, both of Berlin. Eng. Pat. 5464, December 14th, 1881.

ANÆSTOS is first soaked in a strong solution of barium chloride and dried. The impure alcohol vapours are passed over or through layers of this substance, and are thus deprived of the fusel oil.—W. P. T.

Ozone Generator. J. M. Davidson, New York. U.S. Pat. No. 254930, March 14th, 1882.

A TUBE, open to the water but nearly closed at the upper end, containing a stick of phosphorus, rests on a float in such manner that if the float be placed one side up, the tube rises so high that the phosphorus is in large part exposed above the water, while, if the float with its recessed socket be reversed, the bulged head of the tube rests lower down in the recess on the float, and the phosphorus in the tube is entirely immersed.—W. P. T.

Improvement in Distilling Apparatus and in the Process of Purifying Alcohol. E. Darbet. Ger. Pat. 16070, January, 1881.

IN the separating from fusel oil with the distillation column in the distillation of alcohol, the topmost plate of the column is formed of copper A, which carries a short concentric support B. (Fig. 1.) At the upper part of the support are several sieve-like perforated plates attached, above which a bell-jar of sheet copper

FIG. 1.

stands. The alcohol vapours rise through the support B into the bell-jar C, and then descend, in order to escape to the condenser. The plates cause the cooling of the vapours, whereby the concentration of the admixed impure oils follows. In order to separate other from the materials employed for the formation of alcohol, the still is filled about $\frac{1}{4}$ th less than usual, and the liquid is warmed by means of a coil heated with steam to 60° .

The quantity to be made up ($\frac{1}{4}$ th), is brought into a vessel F (Fig. 2), where it is heated with the steam-coil, till the alcoholic vapours generate enough pressure to carry them through the tube K into the still. The vessel F is fitted above with a tube with cock or valve R, for letting off the vapours; above R is a Giffard injector, by which the alcohol vapours are mixed with air. At the deepest part of F is a cock R' and a tube, which is

FIG. 2.

united to the tube coming from R. When the purification of the liquid in the still is terminated, R is closed, the pressure in F increases, and after opening of R the vessel F is emptied. The ethereal vapours are shut off against the still by the valve P, and pass into the condenser L. The alcohol carried along also flows through G back into the still, and the ether vapours are conducted from L to the condenser M.—W. S.

ANALYTICAL CHEMISTRY.

A Means of Quickly Detecting Mineral Acids in Vinegar. Chiappe. Chem. Zeit. vi., 244.

THE colour of a solution of Paris violet (methylaniline violet) is converted into ultramarine blue by even very dilute mineral acids, whereas organic acids do not alter the colour. This behaviour of the above colouring matter is made use of to prove the presence of mineral acids in vinegar.—E. B. S.

Detection of Traces of Silver in Galena, in the Wet way. J. Krutwig. Chem. Zeit. vi., 222.

THIS method is founded on the fact that, from a solution of lead and silver, sodium hydrate throws down these two metals as an intensely-yellow plumbate of silver. The galena is fused in an iron crucible with tartar, soda, and borax; the metallic lead is dissolved in pure nitric acid; any sulphate of lead is filtered off, and large excess of sodium hydrate is added. The precipitated ferric and plumbic hydrates, together with plumbate of silver, are washed and treated with ammonia, which takes up the silver compound. This solution is evaporated to dryness, the residuum is dissolved in nitric acid, and freed from lead by sulphuric acid, after which the silver can easily be recognised by hydrochloric acid, or also from the solution in nitric acid. Sodium hydrate directly precipitates the yellow lead-silver compound. The author is about to adapt this process to a quantitative determination.—E. B. S.

Estimation of Sulphur in Pyrites. Fr. Hockmann, *Ber. d. d. Chem. Ges.* xv., 540.

THE author fuses 0.5 gram. of finely-pulverised pyrites with 25 grms. of a mixture of 6 parts of sodium carbonate and 1 part potassium chlorate, and estimates the sulphate formed by precipitation with barium chloride.—F. H.

On the Estimation of Tannin and Aenogallie Acid in Wines. M. F. Jean. *Compt. Rend.* xciv., 11, Mar. 13, 1882.

FIFTY or one hundred cubic centimetres of wine are evaporated on a sand bath to the bulk of a few c.c. The extract is then mixed with dry precipitated silica, and the whole dried at 60° to 70°C. The mass is powdered and exhausted with ether containing a little hydrochloric acid. The ethereal extracts are evaporated on a water bath and the residue dissolved in 100 c.c. of distilled water. Ten cubic centimetres of this aqueous solution are titrated with iodine solution, sufficient sodium carbonate to neutralise the acids being previously added. The rest of the aqueous solution is agitated with a slight excess of gelatine, to fix the tannin. After standing for several hours the liquid is filtered, and the aenogallie acid estimated in 10 c.c. of the filtrate by titration with iodine solution. The difference in the amounts of iodine solution employed indicates the proportion of tannin in the wine under examination. The iodine solution must of course be standardised by means of a solution of pure tannin.—A. S.

Volumetric Determination of Lead by Permanganate of Potassium. H. v. Juptner. *Report. der Analyt. Chem.* ii., 72.

A NEW method of estimating lead volumetrically has lately been described by Haswell. He finds this upon the reduction of a solution of potassium permanganate by a solution of plumbic nitrate in the presence of some potash, ammonia, and sodium carbonate, and also suspended zinc oxide. The whole of the lead is easily precipitated, especially on heating, in combination with manganese and potassium or zinc, which compound, according to Haswell, has the composition $5\text{PbO}_2, 2\text{MnO}, \text{K}_2\text{O}$. For the reaction the last-mentioned chemist gives the following equations:—

The titration itself has to be conducted in the following way: Dissolve the substance which is to be tested for lead in nitric acid, evaporate to dryness, redissolve in distilled water, add some oxide of zinc suspended in water, and run in a solution of potassium permanganate in the cold while constantly agitating. A brown precipitate immediately ensues, which quickly subsides, and the permanganate solution becomes decolourised, only towards the end of the reaction a faint rose tinge remains. On heating, this colour disappears, and the precipitate completely separates, and now the cautious addition of permanganate solution must be continued until its colour remains permanent, even after boiling for a minute. After about 24 hours this tint also vanishes, because the excess of permanganate acts upon the manganese oxide combined with the plumbic peroxide. This method of titration is very similar to that for manganese, according to Volhard, but has certain advantages over the latter. It has been proved by the author to give very satisfactory results. In this method the presence of alkalis, alkaline earths, alumina, and the oxides of chromium, zinc, and ferric salts in solution is without influence, but manganese, cobalt, nickel, and ferrous acids must not be present. Tin and antimony, being separated as oxides on dissolving, have no effect. Bismuth is to be removed as basic nitrate by repeated evaporation. Copper interferes only if present in large quantities, by its colour, and in this case the lead is best thrown down by ammonium carbonate and ammonia, filtered, and redissolved in nitric acid for titration. Small quantities of silver are harmless; larger quantities are removed in the same way as copper.—E. B. S.

On the Detection of Red Colouring Matters. J. de Groot. *Report. der Analyt. Chem.* ii., 95.

THE author has found a general method of recognising the most usual colouring matters. It consists in the following treatment: To the liquid to be tested add an equal volume of chloroform and three volumes of absolute alcohol, and shake up. To this mixture add two volumes of distilled water without agitating. Many colouring matters separate where the two layers come in contact, while a few only pass into the chloroform solution. The latter is, for instance, the case with fuchsin, whereas carmine collects almost entirely between the two fluids. By the manner of separating as well as by the colouration which they impart to either or both of the two layers, with or without the aid of ammonia, a great many colouring substances, especially of vegetable origin, can be identified.—E. B. S.

Separation of Ether. C. J. H. Warden.

IN separating quinine and amorphous alkaloids from the mixed cinchona alkaloids by agitation with ether, the subsequent removal of the ethereal layer from undissolved alkaloid and from the aqueous stratum is an operation of some little difficulty. If the ether be decanted off, or taken up by a pipette, small quantities of solid matter, as well as watery fluid, are also likely to be removed, while the ordinary separating funnels do not facilitate the operation. To obviate these difficulties the following simple apparatus was devised, and has been found to answer well: The apparatus is essentially a filtering siphon, and consists of a siphon-shaped tube of thick glass, of small bore, on the shorter limb of which a small funnel has been blown, which is provided with a narrow projecting lip, and with a ground flat rim, while the other end of the larger limb is drawn out. The shorter limb is mounted on a cork, in which there is a second aperture, which carries a small bent tube. The cork fits the bottle in which the operation of agitation with ether has been conducted, and which should be long and narrow. To use the apparatus, the funnel is lightly stuffed with a few fragments of cotton wool, and a piece of filter paper tied over the mouth, the flange preventing it from slipping, and the superfluous paper is cut off short. The funnel is then introduced a short distance below the surface of the ether, and the cork fixed. The apparatus has now somewhat the appearance of a wash-bottle, save that the tube from which the liquid escapes is three or four times the length of the tube which is immersed in the liquid. On gently blowing through the open end of the small tube—which may conveniently have a piece of indiarubber tubing attached—the ether is forced through the filter and fills both limbs of the siphon, and then continues to flow automatically into a reservoir placed for its reception. As the ethereal stratum diminishes, the tube carrying the funnel is depressed until its flat surface is within a line or so from the surface of the aqueous layer, and is engaged in the precipitate. When this occurs, air has again to be blown through the small tube, and this is continued until drops of ether escape only at long intervals. The cork carrying the tube is then removed, fresh ether poured into the bottle, agitated, and the series of operations described above again performed; and this may have to be repeated a third time. When it is judged the precipitate has been exhausted of principles soluble in ether, the siphon is removed, and any particles adherent to the base or sides of the funnel brushed off, and the funnel with its attached filter paper, as well as the exit end of the siphon, washed with a small quantity of ether or alcohol. Obviously the apparatus may be used for all operations in which ether, &c., is used for the separation of alkaloids or fatty principles. By having a third aperture in the cork, and fitting into it the delivery tube of a burette, the apparatus could be employed in certain volumetric analyses, the siphon filter acting the part of a Biedle's filter. Under such circumstances the tube carrying the funnel should be depressed until the mouth of the funnel is almost in contact with the bottom of the bottle, and the necessary agitation of the fluid, after additions of the precipitant, would then be effected by drawing air through it by the small bent tube.

Detection of Adulteration of Lard, Tallow, and similar Fats. W. Rüdiger. Chem. Zeit. 1882, 118.

IN order to detect the presence of resin and paraffin oils in lard, the soap prepared from the latter is treated with benzene. Palm-nut oil, which at the present prices could be used as an adulterant for tallow, has, like coco-nut oil, the property, that for the precipitation of its soap a larger quantity of common salt is required than is needed by all other soaps to effect the same result.—D. B.

New Books.

DIE CHEMIE DES STEINKOHLENTHEERS MIT BESONDERER BERÜCKSICHTIGUNG DER KÜNSTLICHEN ORGANISCHEN FARBSTOFFE. VON DR. GUSTAV SCHULTZ. Erste Abtheilung. Vieweg, Braunschweig 1882.

THE work commences with the subject of Destructive Distillation; then follows an account of the process and apparatus for manufacturing illuminating gas, coal tar, and coke; next comes a description of certain forms of coke ovens, in which the tar is recovered as by-product. In the third chapter are given tabulated lists of the constituents of coal tar, followed by certain methods of using coal-tar apart from its distillation. The detailed mode of distillation follows in Chapter 4. In Chapter 5, amongst the processes for separating the various crude constituents, a method of extracting carbolic acid by fractional precipitation is given, in which the so-called middle coal-tar oils, boiling between 150° and 200°, are treated with a strong caustic soda ley (specific gravity, 1.30 to 1.35), so as to extract all the phenol constituents. Afterwards the soda solution is treated fractionally with a crude weak sulphuric acid, obtained by diluting and settling the so-called *spent vitriol*, furnished in the rectification processes for benzol and solvent naphthas. This process seems to present no advantages over the process of partial saturation generally adopted, using a dilute caustic ley standing at about 18° Tw. The latter is obviously the most economical process as regards alkali. In the same chapter Calvert's table is given, furnished by the tars from various coals, and without any comment, the absurd number Calvert gives for the percentage of naphthalene in tar from Newcastle coal, namely, 58 per cent, together with the practically impossible summing up of the constituents to exactly 100 in the case of each tar quoted, whereas every tar-distiller knows the working losses are considerable, and hence to take one constituent as to amount by difference of the sum of the others from 100 is to commit a grievous error as regards the per centage amount of this one. This section of the work closes with a concise description of the manufacture of briquettes from coal-dust and slack, and also of the making of lamp-black. A new section of the work now commences with Chapter 7. A theoretical definition of the chemistry of coal tar as the chemistry of the aromatic and fatty-aromatic substances is proposed. Developing the subject on these lines, Dr. Schultz gives a clear and concise sketch of the theoretical groundwork of this portion of the science, assuredly no easy task. This section is replete with extremely useful and valuable tables, as the first section is with excellent woodcuts. Thus the first or general part ends, and the second or special part of the work is entered upon. It is subdivided as follows: (1) Benzene group; (2) toluene group; (3) diphenylmethane group; (4) diphenyl group; (5) naphthalene group. The derivatives of the typical members of each group are now described, especial attention being paid to those of technical importance.

There is a good chapter on the manufacture of nitrobenzol and anilin, illustrated with woodcuts, also another on the azo and diazo-compounds, with many references to original sources. With anilin black the first volume ends. Volume ii. is yet in the press, but will appear in a few months. Our German readers would probably recognise many of the woodcuts again as having appeared in the older works of Bolley and Kopp, Bolley-Meyer, and Lunge, but the fact that the book is a most useful one, compiled with great care, and supplying a want considerably felt, must secure for it a foremost place amongst works on technical chemistry. Of course the treatment of the section on coal-tar distillation is performed with considerable conciseness and with no great amount of detail, but it may be matter of congratulation for those interested in this branch of chemical industry that the extensive work on this subject by Professor Lunge, now in the press, will shortly appear.—Ed.

Monthly Patent List.

COMPILED BY WM. P. THOMPSON AND CO.

ENGLISH APPLICATIONS.

- 1217 Nathaniel J. Holmes, Primrose Hill Road, London. Improvements in bleaching vegetable fibres, textile fabrics and liquids. March 11.
 1218 Charles Wigg, alkali manufacturer, Liverpool. Improvements in and in connection with the manufacture of chlorine. March 11.
 1261 W. H. Lake, London (in communication from La Société Oesclierg Meulnch & Cie., manufacturers, Paris). An improved method of heating zinc furnaces. March 15.
 1225 J. H. Johnson, London (in communication from the Maschinen Anilin and Sodafabrik, of Mannheim, Baden, Germany). Improvements in the manufacture of artificial indigo. March 16.
 1227 John and James Addle, ironmasters, Glasgow. Improved means for obtaining valuable products from furnace gases. March 16.
 1230 Dan Dawson, Millsbridge, near Huddersfield, Yorkshire. The production of a scarlet colouring matter upon vegetable or silk fibre, also in producing the said colouring matter in the form of a lake, so that it may be used for paper-staining and similar purposes. March 16.
 1238 James Conlong, engineer, Blackburn. Improvements in the manner of and means for dyeing or sizing hanks, and for expelling therefrom the superfluous dye or size. March 16.
 1232 H. A. Bonnerville, Paris (in communication from Adrien Ralu, jun., Paris). Improvements in treating and ameliorating alcohol and alcoholic liquors. March 17.
 1233 David Watson, metallurgist, Manchester. Improvements in the purification of copper precipitate and ores, and in the production of commercial arsenic and phosphorus compounds. March 17.
 1311 Robert Morton, engineer, and Charles G. Williams, consulting engineer, both of Nine Elms, Surrey. Improvements in the manufacture of coal gas. March 18.
 1315 William F. Sweetland, Hendon, Middlesex. Improvements in manufacturing condensed or solidified milk, parts of which are also applicable to the manufacture of condensed substances from other liquids. March 18.
 1312 Christian A. W. Sehon, Hamburg, Germany (in communication from George Luthgen, Berlin). Improvements in the manufacture of glass and in apparatus for the same. March 20.
 1377 William Young, Peebles, and George T. Helly, Midcaldy. Improvements in the production and obtaining of ammonia or ammoniacal compounds from coal, shale, ironstone, limestone, and other substances. March 21.
 1251 Francis B. Hawes, Stratford, Essex. Improvements in and in apparatus for obtaining sulphur and some of its compounds, and in the treatment thereof, and also of the associated products. March 22.
 1236 George J. Andrews, Harrow Road, London, and Frank H. Parker, Guildhall Chambers, London. The purification and decolorisation of sewage. March 22.
 1237 Joseph Birch, consulting mechanician, Stockport, and William Evans, newspaper proprietor, Manchester. Improvements in the construction of furnaces and appliances connected therewith, and in the mode of treating solid and fluid substances used in such like furnaces during the manufacture of malleable iron and steel. March 22.
 1101 Edward Fisher, chemical manufacturer, Doverley, Yorkshire. Improvements in the manufacture of manure and in the apparatus employed therein. March 23.
 1128 Robert Frow, maltster, Mistley, Essex. Improvements in steeping tanks employed in the manufacture of malt. March 24.

1129 Christopher T. Wordsworth, engineer, Leeds, and John Wolstenholme, engineer, Hatfield, Lancashire. Improvements in the method of raising and forcing acids, chemicals, and other fluids, and in the apparatus for effecting the same. March 24.

1145 Walter Springer, manufacturers' agent, 20, Bridgewater Square, London. An improved method of separating cellulose from marine and other fibrous plants, in order to obtain fibre for paper making and other purposes, and in utilising the waste refuse or residuum and liquids resulting therefrom. March 25.

1147 John W. Hepworth, cloth dyer, Churwell, near Leeds. Improvements in machinery for dyeing textile fabrics. Mar. 25.

1153 J. A. Dixon, Glasgow in communication from Dr. Carl Koenig, of Hoechst-am-Main, Germany, a director of the Farbwerke vorm Meister, Lucius, and Brünig, chemical manufacturers. Improvements in the production of colouring matters. March 27.

1156 A. C. Henderson, London (a communication from Chalmir Boz and Sons, tanners, Sedan, France). Improvements in tanning hides and in apparatus therefor. March 27.

1158 L. A. Groth, London in communication from H. R. Paul Rosemann, Berlin. An improved composition for rendering furs, wool, and other combustible materials unflammable. March 27.

1161 Eugene Turpin, civil engineer, Paris. Improvements in the manufacture of explosive compounds, and in means and apparatus for utilising the same. March 27.

1178 J. H. Johnson, London (in communication from Moriz Wainrich, Vienna). Improvements in the manufacture or treatment of sugar. March 27.

1179 Lionel Varley, London (in communication from Henry Heckel, of Cincinnati, Ohio, U.S.). Improvements in the art of making soap from fats and oils, and apparatus for practising such improvements. March 28.

1191 Peter Spence, manufacturing chemist, Manchester. Improvements in the treatment of gases arising from the manufacture of salts of ammonia from gas liquor. March 28.

1207 Thomas Howen and Esau Jenkins, both of Morriston, Glamorganshire. Improvements in and appertaining to furnaces for annealing metal plates or sheets, applicable also for annealing or calcining other materials. March 29.

1231 Russel Atken, Westminster. Improvements in the extraction or separation of gases from molten metals, glass, slugs, and the like, and in the apparatus employed in the said extraction or separation. March 29.

1241 James A. Kendall, Balston, Middlesex. Improvements in the treatment of coal gas and similar gases, in order to render the same more suitable for obtaining benzole and its derivatives therefrom. March 30.

1251 Edward Rogers, of the firm of E. Beanes and Co., Falcon Works, Hackney Wick, Middlesex. Improvements in the treatment of grain preparatory to its use for brewing and other purposes. March 30.

1261 James Walker, Leeds. Improvements in purifying coal gas. March 31.

1276 W. A. Barlow, London (a communication from Louis Bonnin, Paris). Improvements in separating tin from tinplate scrap or lined articles. March 31.

1285 John F. Allan and William B. Adamson, both Glasgow. Neutralising, separating, or absorbing the products of combustion of coal gas or other gases, also the products of combustion of petroleum, shale, or other oils. April 1.

1286 Thomas G. Young, of Kelly, Herefordshire. Improvements in the bleaching of jute and other substances. April 1.

1291 H. B. Lusk, London in communication from Edward Wilhelm, Buffalo, New York, U.S.). Improvements in processes, machinery, and apparatus for the manufacture of starch and other useful products from maize and other grain, and for similar purposes. April 1.

1291 Sir Walter W. Hughes, Baywater, Middlesex. Improvements in reverberatory furnaces, for the more rapid smelting of the ores of copper and other metals, and in working the same. April 1.

1625 Edward A. Cowper and Thomas Softwith, both of St. George Street, Westminster. Improvements in the method and apparatus for the recovery of lead and other metallic substances from furnace fumes. April 1.

1630 John H. Spence, Lombard Street, London, and Alexander Watt, Chemist, Charlton, Kent. An improved process for obtaining cattle soda and chlorine by the decomposition of sodium solutions. April 1.

1655 E. A. Brydges, Berlin (a communication from A. Mitscherlich, Münden, Germany). Improvements in the process of producing tannin, whereby the minor products, such as cellulose, gum, acetic acid, and bisulphite of lime, are obtained. April 6.

1653 Ludwig Mond, Warrington Hall, Northwich, manufacturing chemist. Improvements in the manufacture of the peroxide of the alkalies, alkaline earths, and hydrogen, and the application of the same for bleaching purposes, as far as regards peroxide of calcium. April 6.

1660 Percy C. Gilchrist and Sidney G. Thomas, metallurgists, Palace Chambers, Westminster. Improvements in the manufacture of nickel. April 6.

1706 Carl M. Pieschecker, Kilburn, Middlesex. An improved method for the continuous distillation, boiling, saponification, and acidification of fats, oils, glycerine, resins, and hydrocarbons, and improved apparatus in connection therewith. April 10.

1721 Farnham Maxwell Lyte, of the Science Club, Saville Row, Middlesex. Improvements in the manufacture of lead peroxide, also applicable to the production of other metallic peroxides.

1725 Dr. Oskar Liebreich, Berlin. Improvements in the manufacture of soap and of fat acids from oleaginous fruits, seeds, or grain. (A communication.)

1728 Jesse Park Hattershall, New York. Improvements in processes of manufacturing glycerine from soap liquor. (A communication.)

1730 Otto Bredt and Company, Unter Barmen, Germany. A new or improved process for the manufacture of red and yellow colouring substances. (A communication.)

1752 Société de la Manufacture de Javel, chemical manufacturers, Paris. Improvements in the manufacture of sulphuric acid. (A communication.)

1753 Wilhelm Hölbig, Auezig, Germany. Improvements in the manufacture of sulphide of sodium and sulphide of potassium. (A communication.)

1816 E. Fremy and Victor Urbain, both of Paris. Improvements in the treatment of vegetable fibres used in textile manufactures. (A communication.)

CANADA.

1311 John W. McKnight, Washington, D.C. Improvements on artificial stone, tile, and marble. December 12, 1881.

1346 Horace Williams, Buffalo, New York, U.S. Improvements on the process and apparatus for crystallising grape sugar. December 20, 1881.

1267 John M. Reid, Montreal, Quebec. Improvements in the manufacture of plaster of paris. December 21, 1881.

1378 Henry H. Vivian, Swansea, Wales. Improvements in the manufacture of bronze. December 23, 1881.

VICTORIA (AUSTRALIA).

3001 Carl Wagemann, civil engineer, Melbourne. Improvements in machine for reducing and classifying ores, and for amalgamating the metals contained therein. April 30, 1881.

3225 John Dixon, gas engineer, Richmond, and also of Liverpool, England. The manufacture of an improved gas and the apparatus and method therein employed. June 10, 1881.

FRANCE.

11183 Hichon, Paris. Using the graphite of gas retorts in iron foundries. August, 1881.

11203 Landrin, Paris. Vegetable extract for green and yellow colouring of liquors. August 2, 1881.

11213 Solvay. Treatment of native phosphate of lime. August 2, 1881.

11210 Müthes and Endorlin. A process and apparatus for dyeing and bleaching cotton and wool on spinelles. August 4, 1881.

11215 Michaëlis. Vinegar making. August 4, 1881.

11236 Jacoby and Jönnings. A bleaching apparatus. Aug. 9, 1881.

11239 Sebillot. Chemical treatment of compound ores. August 9, 1881.

11221 Maurice. Extracting and classing phosphate of lime and grey chalk. August 10, 1881.

11237 The Dessau Sugar Refinery Company. Manufacturing hydrate of strontium. August 11, 1881.

11216 Precht. Absorbing and utilising the sulphurous acid contained in the products of combustion and gases of roasting processes by means of hydrate of magnesium and alumina. August 11, 1881.

11234 The Baden Anilino and Soda Works. Converting alizarin blue in soluble combinations. August 13, 1881.

11231 Degener and Yates. Treatment of sugar juice. Aug. 13, 1881.

GERMANY.

17721 C. T. Jacoby and W. Jennings, Nottingham. A bleaching apparatus. August 23, 1881.

17722 H. S. Chino, Boston. Apparatus for obtaining artificial leather. August 31, 1881.

17735 E. Thoben, Pilsen. Obtaining writing slates of Sorol's magnesite, hydraulic cement, marble cements, and such-like stone substances. June 9, 1882.

17731 S. Reich and Co., Berlin. A process and apparatus for smelting glass. June 11, 1881.

17768 Michael Kellon and Hertzog, Rhodina. A tanning apparatus. June 22, 1881.

17779 C. S. Higgins, Brooklyn. Manufacturing soap. July 23, 1881.

17735 G. Borscho and F. Brunjes, Leopoldshall. Separating chloride of sodium from the magnesian sulphate of potash or schoenite. June 17, 1881.

17815 W. T. Jubb, Buffalo, U.S. A process and apparatus for manufacturing starch, glucose, and hard grape sugar. March 21, 1881.

17821 Hölhoff, Berlin. Obtaining explosives by the direct nitration of coal, peat, and their natural raw products of distillation. May 17, 1881.

17826 The Institut Pictet Company, Paris. Improvements in the rectification of alcohol and in the methodical separation of mixed liquids. June 11, 1881.

17829 J. T. Monneins, Girondo. A fast tanning process. June 22, 1881.

1750 C. W. Hamany, Brooklyn. An apparatus for the treatment of fermented, fermentable, or distilled liquors, and for preserving, oxidizing, or ageing the same. June 23, 1881.
 1780 E. Ernst, Hildbrath. Obtaining ammonia. Feb. 8, 1881.
 1781 H. Zedler, Jungbunzlau, and Dr. W. Ghil, Prague. An apparatus for the continuous carbonization and distillation of the wash of molasses. May 28, 1881.
 1786 J. A. Kemball, London. A process for obtaining dinitrobenzole from lighting-gas. June 23, 1881.
 1782 E. A. Schott, Kriensau. Purifying beet juice. August 27, 1881.
 1790 W. Gundermann, Heilbronn. A process of obtaining sugar from alcoholic solutions of molasses or syrup, as patented No. 5592. March 13.
 1792 R. Elsonmann, Berlin. Purifying spirits. June 19, 1881.
 1792 A. J. and A. G. Reynolds, Chicago. A continuous molting apparatus. August 16, 1881.
 1796 Buck Bros., Lubek. Concentrating vinegar by evaporation with chloride of calcium. October 26, 1881.
 1793 C. Golay, Paris. Apparatus for obtaining malt. June 21, 1881.
 1790 F. A. Hasse, Welsch. A process and apparatus for preserving organic substances. November 17, 1881.

AUSTRIA-HUNGARY.

G. Dototnyl and Muller Bros. Buda-Pesth. Obtaining tannic oxide. January 19, 1882.
 E. Hittanszky, Nagyban. Extracting gold and silver even from poor ores, by a combined roasting and leaching process. January 19, 1882.
 J. Schorn, Vienna. A process and so-called high-pressure and vacuum extractor, for extracting colouring and tannic substances. November 10, 1881.
 S. G. Thomas, London. Lining basic Bessemer converters. November 11, 1881.
 L. Hensfield and J. Enge, Vienna. Obtaining artificial ivory and elastic stone-ware for billiard balls and other fancy articles, and also for roofings, walls, and floors. November 11, 1881.
 F. S. Harit, Kilburn, England. A composition for preserving organic substances. November 11, 1881.
 S. G. Thomas, London. Obtaining basic compounds highly fritted. November 11, 1881.
 J. B. Mallon and C. Lavell-de-Capitani, Milan. Basic fireproof bricks of magnesite and lime. November 11, 1881.
 The Sugar Refining Company, Dessau. Obtaining and utilizing dibasic saccharate of strontium, $C_{12}H_{22}O_{11} + 2SrO$, and apparatus therefor. November 11, 1881.
 H. S. Chaze, Boston. Manufacturing artificial leather and such-like materials and compositions, and machines employed therefor. November 12, 1881.
 L. Letrange, Paris. Treatment of zinc ore and zinciferous substances by electricity. November 12, 1881.
 F. J. Bolton and J. A. Wanklyn, Westminster. Manufacturing lighting gas. November 16, 1881.
 J. B. M. P. Clowson, Paris. Obtaining soda and salt of magnesite. November 16, 1881.
 W. Weldon, Frankfurt-on-Main. A process and apparatus for obtaining chlorine. November 21, 1881.
 W. Weldon and G. Strype, London. Purifying muriatic acid. November 23, 1881.
 J. Hilttinger, Temeswar. An apparatus for steaming maize for farm stills. November 21, 1881.
 W. Weldon, Frankfurt-on-Main. Obtaining muriatic acid and chlorine from chloride of magnesium. November 17, 1881.
 C. Latzel and E. Bauer, Hohn. A quick fermenting process for obtaining the yeast contained in mash. December 3, 1881.
 T. Richters, Breslau. A process and apparatus for ungreasing fatty substances, by employing the low-pressure vapours of sulphides of carbon, benzole, etc. December 3, 1881.

BELGIUM.

57019 A. Ittleman, Hnam. Manufacturing pulps for protection from rust. February 9.
 57031 J. Wild and J. Schumbeck, Saar and Munich. Incombustible paint. February 10.
 57031 The Wool Company, Paris. Destroying vegetable substances contained in filamentous animal substances. Feb. 10, 1881.
 57012 C. Humpfl, Paris. Manufacturing colouring substances for dyeing and printing. February 11.
 57013 G. Scheibler. Defecating beet juice. February 11.
 57025 Frohlich and Co., Zeltz. Obtaining pure acetic acid from vinegar or spirit. February 13.
 57023 O. Lehmann, Altona. Obtaining artificial human milk. February 13.
 57061 E. Luck, London. Apparatus for saccharifying ungerminated grain. February 13.
 57005 E. Luck, London. Apparatus for acetylising alcoholic liquors and for ageing alcohol. February 13.
 57070 W. F. Held and D. Johnson, London. Manufacturing explosives. February 13.
 57081 L. A. Chevalier, Paris. An apparatus for the physical and chemical washing of gum. February 11.
 57077 J. G. Jengenborg, Hylboholm. Dyeing cotton. Feb. 10.
 57107 J. E. Dawson, London. Manufacturing and treating gas and apparatus employed therefor. February 17.

57127 H. Tietz, Brunswick. Purifying and decolouring sacchariferous liquids. February 21.
 57111 T. Richters, Breslau. Obtaining pulverised nitrous manure. February 23.
 57136 H. A. Schulle, F. A. Reichenek, and L. Pönnig, Düsseldorf. Extracting tin from metals or metallic refuse. February 25.
 57139 A. Osierrloth, Frankfurt-on-the-Main. A photo-electrotype and photo-electroplastic process. February 25.
 57175 V. Leger, St. Gilles. Manufacturing starch or colours. February 27, 1882.
 57176 The Patent Cork Coating Company, Copenhagen. Obtaining a heat and waterproof substance called cork asphalt. February 27.
 57180 G. Prim, Mons. Obtaining nitrous products by means of electricity and atmospheric air. February 27.
 57189 T. Oppler, Duos. Manufacturing soda of ammonia. February 28.
 57191 E. Solvay, Brussels. Treatment of native phosphate of lime.
 57193 T. B. Fogarty, New York. Processes and apparatus for the manufacture of lighting and heating gas. February 28.
 57201 J. P. Kagenbusch, London. Extracting precious metals. March 1.
 57215 H. Zimeczynski, Halle. A process and apparatus for obtaining caustic strontium and caustic barium by means of sulphates. March 2.
 57217 H. Hutwer, Frankfurt-on-the-Main. Reducing and separating gold, silver, copper, and lead. March 2.
 57217 Mrs. Pourbais, Brabant, Brussels. An apparatus for obtaining carburetted air gas. March 1.
 57218 C. Scheibler, Berlin. Defecating or purifying beet juice, etc., by means of saccharates of strontium in a solid or dissolved state. March 1.
 57220 C. Scheibler, Berlin. Decomposing saccharate or strontium obtained at a boiling point into hydroxide of strontium and into sugar solution containing strontia. March 1.
 57228 C. A. W. Selon, Hamburg. Continuous glass kilns. March 6, 1881.
 57243 W. T. Jobb, New York. Processes and apparatus for extracting starch from grain for the manufacture of grape sugar, etc. March 1.

ITALY.

13121 P. Buchy and J. Strangman, Sarno. Bleaching hemp, flax, and other vegetable fibres. October 1, 1881.
 13111 W. Scott and C. J. Townsend, Paris. Extracting sulphur from iron and copper pyrites. October 10, 1881.
 13117 A. Piccone, G. Di Giorgio, and F. D'Angelo, Palermo. An apparatus for treating native sulphur ore for fusion and distillation. October 10, 1881.
 13129 Leonardi and Zambelli, Turin. An azote generator for agricultural, chemical, and industrial purposes. October 13, 1881.
 13170 J. M. Fry, Meurad, Algeria. Utilising the spent lye of soap works for the manufacture of artificial building stones. October 22, 1881.
 13171 E. Turpin, Paris. Improvements in the manufacture, treatment, and application of peroxide of nitrogen or hyponitric acid, and in apparatus belonging thereto. October 22, 1881.
 13172 R. Hagen and F. Sellum, Forchheim. Manufacturing gelatine. October 22, 1881.
 13123 H. F. Dehlinger, Berlin. A process and apparatus for the direct manufacture of rectified alcohol by means of a distilling liquid. November 8, 1881.
 13141 E. A. Wirbel and Co., Stagnan. A product called phosphobutyraline for superseding maceration in tanning. November 21, 1881.
 13133 E. Pyrkosch, Rattvor. Processes and apparatus for extracting grease from fatty substances. November 23, 1881.
 13162 H. H. Vivian, Swansea. Manufacturing bronze. Nov. 17, 1881.
 13181 G. Cor, Cartellajoux. Processes and apparatus for purifying turpentine oil. November 24, 1881.
 13181 J. Hargreaves and T. Robinson, Widnes. Treatment of ores and substances containing metallic antimony and other products, and apparatus employed therefor. Nov. 25, 1881.
 13187 P. Palmieri, Portici. Employing raw or refined cotton oil, by itself or mixed with other substances, for tanning. November 28, 1881.
 13165 A. French, Swansea. A process and apparatus for obtaining white compounds of pigments from substances or ores consisting of or containing lead and zinc. Dec. 3, 1881.
 13125 A. Dick, London. Copper alloys. December 9, 1881.
 13111 H. Brothmann, Brussels. An explosive called pyro-nitro. December 10, 1881.
 13131 C. Hoewag, Paris. Treatment of native sulphur ores by compressed sulphide of carbon. December 12, 1881.
 13108 W. Schneider, Lehrsberg. Apparatus and processes for ungreasing bones and other fat bodies by means of sulphide of carbon, benzene, and other similar substances. Dec. 16, 1881.
 13111 G. Bianchi, Alessandria. A continuous kiln for burning carbonates and sulphates of lime, bricks, etc. Nov. 19, 1881.
 13701 F. Armandy, St. Fons. Distilling and purifying glycerine in vacuo. December 22, 1881.
 13710 V. Alder, Vienna. Obtaining cyanides and cyanates of alkaline and alkaline ternary metals by means of atmospheric nitrogen and carbonising gases in closed apparatus. December 27, 1881.