

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

SEPTEMBER 3, 1926.

I.—GENERAL; PLANT; MACHINERY.

Protecting thermocouples by transparent silica tubes. R. A. RAGATZ and O. A. HOUGEN (Chem. Met. Eng., 1926, 33, 415).—A thermocouple enclosed in an ordinary translucent fused silica protection tube when used at above 900° in a reducing atmosphere shows a falling off in E.M.F. due to the porosity of the tube under these conditions. This was found not to be the case with transparent silica tubes tested up to 1200°. Devitrification of the tube is also very much less than with the older type of fused silica.
C. IRWIN.

See also A., Aug., 787, **Temperature of vapour evolved from solutions** (REISSMANN). 789, **Adsorption from viscous media by charcoal** (WEISSENBERGER, BAUMGARTEN, and HENKE). 800, **Heats of adsorption and problem of promoter action** (FRYLING).

PATENTS.

Reverberatory furnaces. B. VERSEN (E.P. 243,751, 26.11.25. Conv., 27.11.24).—A regenerative reverberatory furnace is provided with ports for combustible gas and air situated behind each other on the centre line of the furnace, the two gases arriving in an upward direction. Converging streams of a pressure medium (compressed air) are directed across the gas ports and are inclined downwards so that the most intense heat is generated on the surface of the bath in the centre of the furnace and the walls and roof are at a relatively lower temperature. The jets of pressure medium may vary in size and velocity to improve the mixing, and the nozzles are protected from the heat by a fireproof casing arranged in a recess in the furnace end, also, if desired, by water cooling; and a slight flow of pressure medium is allowed to pass through the fireproof casing even when the operation of the furnace is reversed.
B. M. VENABLES.

Pulverising or grinding mills. B. SCHERBAUM (E.P. 245,435, 15.12.25. Conv., 31.12.24).—The fixed portion of the apparatus consists of a vertical cylinder provided on its inner surface with teeth arranged in courses; the number of teeth in a course increases, but their pitch and thickness decrease from the top downwards, *i.e.*, in the general direction of the material being ground. The moving portion of the apparatus comprises a vertical shaft having outwardly projecting teeth in courses intercalating with the courses of the fixed part. Both the moving and fixed portions are divided horizontally into sections so that the parts may be readily changed for

others more suitable to the material being ground, and the fixed portion is made slightly expansible (by dividing it segmentally) so that the clearances may be altered.
B. M. VENABLES.

Grinding or crushing machines. W. J. BOOTH (E.P. 253,817, 29.12.25).—The grinding is effected between a fixed outer annular ring of abrasive material and two or more curved segments which are dragged around the interior surface of the ring by drag-links, centrifugal force being sufficient to keep them in contact.
B. M. VENABLES.

Pulverising mills. E. C. LOESCHE (E.P. 247,562, 10.2.26. Conv., 12.2.25).—The rotating grinding track of a pulveriser is combined in one piece with the extraction fan.
B. M. VENABLES.

Pulverising mill. L. C. BONNOT and W. M. BARKER, Assrs. to BONNOT Co. (U.S.P. 1,589,740—1, 22.6.26. Appl., [A] 30.7.25, [B] 4.11.25).—(A) An exhaust fan communicates directly with the rotary drum of a ball mill, and means are provided for positively preventing the grinding balls from entering the fan. (B) A rotary drum containing grinding balls is provided at one end with a feed opening and at the other end with an axial discharge outlet in the form of a cone flared inwards. The larger end of the cone is unobstructed. Means are provided for impelling a current of air from the inlet to the outlet and for repelling the grinding balls and coarse material from the mouth of the discharge cone.
H. HOLMES.

Centrifugal machines. A. G. ENOCK (E.P. 253,653, 14.4.25).—The liquid to be treated is fed to the interior of an inner rotating bowl, and passes through perforations in the back of the bowl to an outer bowl rotating at the same speed, and is finally discharged through other perforations at the front end in the extended wall of the inner bowl; the two portions of the inner bowl are divided by an annular baffle through which the feed pipe is introduced. Separated solid matter is collected in pockets formed by vanes in the space between the bowls, the vanes being made of spiral form to guide the liquid through the space from back to front.
B. M. VENABLES.

Apparatus [horizontal centrifuge] for continuously separating liquids from solids. H. C. BEHR (U.S.P. 1,589,097, 15.6.26. Appl., 4.12.23).—In a continuous horizontal centrifuge for separating liquor from granular aggregates, spaced inner and outer concentric foraminous cones are rotated at different speeds about a horizontal axis. The inner cone carries a screw conveyor for moving

the material over the inner surface of the outer cone from the small to the large end. The outer cone carries, integral with it, means for gathering and expelling outwards in a narrow zone undiluted liquor separated at the small end of the cone, and other means for gathering and expelling outwards, in a narrow zone spaced from the first zone, diluted liquor separated at the large end of the cone. A movable partition is provided for adjusting the proportion of diluted to undiluted liquor, and receptacles are arranged to receive these liquors and the washed solids discharged over the large end of the outer cone.

H. HOLMES.

Evaporator. M. J. KERMER (U.S.P. 1,588,029, 8.6.26. Appl., 20.3.24).—The liquid to be evaporated or dehydrated is fed to the interior of a rotating vessel, which is provided with a rotating steam jacket. The stream of liquid passes down the interior of the vessel and is discharged at the bottom. The centrifugal force causes water from the condensed heating steam to be thrown outwards, with the result that the heating efficiency is unusually good, since there is no film of water on the heat-transmitting surface.

E. S. KREIS.

Apparatus for dehydrating liquids. L. A. ZOHE (U.S.P. 1,588,929, 15.6.26. Appl., 28.2.21).—A centrifugal fan mounted in a closed chamber is provided with an inlet for the liquid and for a moisture-absorbing gas. The mixture is thrown from the fan against a surrounding wall rotating about the axis of the fan, so that the liquid forms a film on the wall.

H. HOLMES.

Filtering material. W. H. HOODLESS (U.S.P. 1,589,531, 22.6.26. Appl., 10.3.21).—Kieselguhr having its internal structure lined throughout with a thin film of finely-divided decolorising carbon is prepared from an intimate mixture of dry kieselguhr and dry sawdust, which is placed in a retort closed except for a small opening. The retort is heated until a combustible vapour escapes from the opening, and the temperature is then maintained constant until combustible vapour ceases to escape.

H. HOLMES.

Decolorising and filtering material. W. H. HOODLESS (U.S.P. 1,589,532, 22.6.26. Appl., 10.3.21; cf. preceding abstract).—The internal structure of particles of kieselguhr is lined with a thin film of carbon from heat-charred molasses.

H. HOLMES.

Filter-press. F. J. BISBEE (U.S.P. 1,589,834, 22.6.26. Appl., 12.1.25).—Filter-plates are mounted face to face on an unobstructed longitudinal support. Stationary members, one at each end of the support, serve alternately as abutments toward which the plates are moved when they are to be separated. A movable head is mounted near each end of the support, and each head is provided with means by which it is actuated to move the plates toward the stationary head at the other end.

H. HOLMES.

Retort. S. FORSSÉN (U.S.P. 1,589,746, 22.6.26. Appl., 25.11.24. Conv., 21.12.23).—The material to be treated is placed in an inner vessel having its walls spaced concentrically from an outer casing. The bottom of the vessel is frusto-conical with a central aperture, and the top is provided with an aperture in axial alignment with the bottom aperture. A cover on the casing is spaced from the top of the vessel, and the bottom of the casing is spaced from the bottom of the vessel. These spaces communicate freely with the annular space around the vessel, and a draught-inducing device is mounted in the aperture at the bottom of the vessel for circulating air, heated in the annular space, through the vessel.

H. HOLMES.

Apparatus for subjecting gases or vapours to the absorptive action of solids. FARBW. VORM. MEISTER, LUCIUS, & BRÜNING (E.P. 239,189, 11.8.25. Conv., 28.8.24).—See G.P. 421,027; B., 1926, 425.

Apparatus for intimately mixing gases and liquids. FARBENFABR. VORM. F. BAYER & Co., Assees. of E. STRODER (U.S.P. 1,592,231, 13.7.26. Appl., 8.6.23. Conv., 20.6.22).—See E.P. 199,718; B., 1924, 81.

Rotary drying machine. J. A. REAVELL (U.S.P. 1,591,053, 6.7.26. Appl., 12.11.23. Conv., 28.2.23).—See E.P. 216,577; B., 1924, 621.

Pulverising machine. E. CHARTON and P. M. MONGEREAU (U.S.P. 1,591,283, 6.7.26. Appl., 26.11.23. Conv., 25.10.23).—See E.P. 223,582; B., 1925, 655.

Machine for pulverising or grinding coal and other materials. P. W. GRIFFIN, Assr. to VICKERS, LTD. (U.S.P. 1,591,758, 6.7.26. Appl., 20.7.23. Conv., 25.7.22).—See E.P. 205,873; B., 1924, 7.

Extraction, solution, and mixture of soluble and insoluble substances. N. BENDIXEN, Assr. to F. R. M. Co., LTD. (U.S.P. 1,592,713, 13.7.26. Appl., 20.4.25. Conv., 27.8.24).—See E.P. 242,020; B., 1926, 2.

Heat exchangers. G. K. ENGELHART, Assee. of C. B. GRADY (E.P. 242,231, 30.6.25. Conv., 30.10.24).

Absorption refrigerating apparatus. MANNESMANN KÄLTE-IND. A.-G. (E.P. 244,725, 6.11.25. Conv., 17.12.24).

Liquid fuel furnaces. A. LAING (E.P. 254,618, 3.2.26).

Surface condensers. MIRRLEES WATSON Co., LTD., and W. A. DEXTER (E.P. 254,626, 13.2.26).

Extraction process and apparatus (U.S.P. 1,587,646).—See XVII.

II.—FUEL; GAS; DESTRUCTIVE DISTILLATION; MINERAL OILS.

Constitution of coal. S. W. PARR (Ind. Eng. Chem., 1926, 18, 640—648).—On submitting normal coal to a current of oxygen at 100° a steady increase in weight occurs, with the formation of moisture and carbon dioxide. In 45 days 8.5% of moisture was formed and 6% of carbon dioxide, and the coal increased in weight about 7%. At normal temperature 6% of moisture and 1% of carbon dioxide only were formed in 46 weeks, the increase in weight being 2%. Very different results are obtained by heating unoxidised and oxidised lignitic and bituminous substances (the portions of coal insoluble and soluble respectively in phenol) to about 300°. Thus 100 g. of fresh lignitic substance evolved 153.2 c.c. of carbon dioxide, but the oxidised substance evolved 1423.0 c.c. Fresh bituminous material evolved 462.5 c.c., but oxidised bituminous material evolved only 244.0 c.c. When oxidised lignitic substance (insoluble in xylene) and fresh bituminous substance (soluble in xylene) were re-mixed, it was found that the coking property of the mixture had been destroyed by the oxidation of the lignitic substance. In experiments to determine the melting or softening point of coal it was found that this was associated with the bituminous substance alone; the melting or coking property is destroyed by oxidation. Experiments on coal carbonisation at about 750° are described. H. MOORE.

Adsorption of carbon dioxide by coal. E. SINKINSON and H. G. TURNER (Ind. Eng. Chem., 1926, 18, 602—605).—To study the adsorption of carbon dioxide a 218-c.c. container was used closed by a stopper at the bottom. This was fitted with an axial thermocouple extending to the inside of a cup introduced from the bottom of the container and containing about 10 g. of the coal or charcoal to be tested. Means were provided for exhausting the flask and for introducing a measured volume of carbon dioxide, which remained in contact with the coal for 45 min. The adsorbed gas is held very tenaciously, the last traces being removable with difficulty under a vacuum of 0.003 mm. High-grade coals are more adsorptive than low-grade coals, and the same remark applies to the charcoals (fixed carbon residues) from such coals. Moist carbon dioxide is adsorbed to a greater extent than the dry gas. In the adsorption of oxygen by coal the volume of carbon dioxide recovered is not a true index of the amount of oxidation taking place. The adsorption of carbon dioxide from mixtures of carbon dioxide and oxygen is proportional to its partial pressure. The rise in temperature is generally proportional to the volume of gas adsorbed. The adsorption of carbon dioxide produces a greater rise in temperature than the adsorption of oxygen. H. MOORE.

Friability tests on various fuels sold in Canada. J. H. H. NICOLLS (Dept. of Mines, Canada, Investigation of Fuels and Fuel Testing, 1924, [644], 20—35).—Three sizes of fuel (stove size, 1½ in.—2 in.;

nut size, 1 in.—1½ in.; pea size, ½ in.—1 in.) were examined by means of shatter and tumbling tests. The following order in friability of fuels was obtained: peat the least friable; by-product coke, Pennsylvania anthracite, Welsh anthracite, bituminous coals and lignites; and semi-bituminous or "smokeless" coals. Weathering under cover increased the friability of the lignites; weathering in the open increased considerably the friability of all the fuels except the coke, but even after weathering, the peat was more resistant to breakage than most of the unweathered fuels. A. C. MONKHOUSE.

Effects of exposing Canadian lignite to atmospheres of different humidities. J. H. H. NICOLLS (Dept. of Mines, Canada, Investigation of Fuels and Fuel Testing, 1924, [644], 36—44).—Typical Alberta lignites were air-dried under different conditions of humidity comparable with summer and winter humidities and also at a standard relative humidity of 60%, using calcium chloride solution of *d* 1.30. Using similar conditions of humidity the minimum percentage of moisture to which a lignite will dry is higher than the maximum value obtained when starting with the same lignite dried at 90°. For the purposes of classification of the lignites air-drying must be carried out under standard conditions of humidity. A. C. MONKHOUSE.

Coking experiments on coals from the Maritime Provinces. B. F. HAANEL and R. E. GILMORE (Dept. of Mines, Canada, Investigation of Fuels and Fuel Testing, 1924, [644], 1—19).—An investigation of the suitability of the coking coals of New Brunswick and Nova Scotia for the production of domestic coke is described. Laboratory tests and large-scale tests in a battery of Semet-Solvay coke ovens were made together with tests on the combustibility of the resulting cokes. 52 Nova Scotia coals had average ash and sulphur contents of 11% and 3.3% respectively as compared with 24 New Brunswick coals with 15% and 6.9%. Satisfactory cokes for domestic purposes were obtained by blending, and washing the coals reduced the ash and sulphur contents. A. C. MONKHOUSE.

Report of carbonisation and washing experiments on sub-bituminous coal from Coal Valley, Alberta. R. A. STRONG (Dept. of Mines, Canada, Investigation of Fuels and Fuel Testing, 1924, [644], 60—68).—Coal mined from the open quarry section of the mine gave on analysis, lump: ash 8.7%, calorific value 11,255 B.Th.U. per lb.; slack: ash 21.2%, calorific value 9325 B.Th.U. per lb. By washing, the ash of the "slack" coal was reduced to 15%. A laboratory carbonisation at 600° yielded 8½ gals. of tar per ton and the calorific value of the coke produced was 15% higher than that of the original coal. The fuel is unsuitable for domestic fuel unless briquetted. A. C. MONKHOUSE.

Distillation of oil shale. A. A. SWINNERTON (Dept. of Mines, Canada, Investigation of Fuels and Fuel Testing, 1924, [644], 69—81).—The different methods used by the Canadian Dept. of Mines and U.S. Bureau of Mines for the evaluation of oil shales

are compared (cf. Gilmore and Swinnerton, B., 1926, 116). With a particular shale the yields of oil in gals. per short ton were 28 with the horizontal tube, 29 with the Scotch tube, 30 with the cross retort in a lead bath, 31 with the large field-assay retort, and 32 with the small field-assay retort. Excessive cracking of the heavier oils occurred with the horizontal tube retort. The use of steam, particularly in the small field-assay retort (350-g. charge), did not materially affect the yield of crude oil but caused a decrease in the light oils and an increase in the heavy oils.

A. C. MONKHOUSE.

Hydrogen from water-gas. R. M. EVANS and W. L. NEWTON (Ind. Eng. Chem., 1926, 18, 513—517).—The conversion of a mixture of water-gas and steam into hydrogen and carbon dioxide may be effected catalytically by passing the mixture over metal oxides. At temperatures of 380° and 444° cobalt oxide and iron oxide are the most active single-component catalysts, and the most generally suitable catalyst is composed of precipitated cobalt (or iron) oxide with a small admixture of aluminium oxide (2—5%) and potassium oxide (1%). The cobalt catalyst is gradually and permanently poisoned by traces of hydrogen sulphide, carbon disulphide, and carbon oxysulphide. The iron catalyst is rendered less active by traces of hydrogen sulphide and carbon oxysulphide, but regains its original activity when the pure water-gas mixture is again passed over it. The poisoning action of a small concentration of carbon disulphide on the iron catalyst is similar to, but about ten times as powerful as, that of hydrogen sulphide and carbon oxysulphide.

W. T. K. BRAUNHOLTZ.

Reduction of carbon monoxide under ordinary pressure. A. JAEGER and H. WINKELMANN (Abhandl. Kennt. Kohle, 1925, 7, 55—62; Chem. Zentr., 1926, I, 3517—3518).—The yields of methane and of mixed oxides of carbon obtained by passing a mixture of 26% of carbon monoxide and 67% of hydrogen over a nickel-pumice catalyst are, respectively, 12% and 12% at 220°, 54% and 7% at 245°, and 66% and 6% at 250°. The optimum temperature for methane formation lies in a narrow zone at 250°. A mixed copper-nickel catalyst yielded only 6% of methane; no ethylene could be detected when a palladium catalyst was used. Contrary to the results of Church (F.P. 519,649) no formaldehyde is formed when a mixture of carbon monoxide, hydrogen chloride, and hydrogen is passed over cuprous chloride, copper, iron, or nickel at 200—300°; it is produced in considerable amounts, however, when formic acid vapour mixed with hydrogen is passed over metals at lower temperatures, or over indifferent substances at higher temperatures or through an empty glass tube at 700—750°. Carbon monoxide and steam yield small amounts of formic acid when passed over hydrated silica at 320°; at 450° in a quartz tube about 1.5% of the carbon monoxide is converted into formaldehyde. This yield decreases with rising temperature and increasing stream-velocities (100 c.c./min.) and no formaldehyde is

formed at all when copper- or nickel-pumice catalysts are used or when the steam is replaced by hydrogen. Hydrogen free from hydrogen sulphide or prepared by dehydrogenation of tetralin (tetrahydronaphthalene) does not reduce carbon monoxide to formaldehyde at 400°. Formaldehyde likewise is not obtained by reducing the compound $K_3Fe(CN)_6CO$ with hydrogen.

S. K. TWEEDY.

Coal gas poisoning. Resuscitation experiments on animals with lobeline. DOLLINGER (Gas- u. Wasserf., 1926, 69, 561—566).—Experiments on apes show that symptoms of poisoning from illuminating gas, due to the presence of carbon monoxide, appear almost as soon with low concentrations of carbon monoxide as with high. Injection of lobeline effects resuscitation much more rapidly than artificial respiration. Cardiac injection gave the quickest results but the results of intramuscular injection also were mostly good. Unfavourable after-effects were not observed, and it is concluded that injection of lobeline affords a rapid means of resuscitation in cases of carbon monoxide poisoning.

R. BRIGHTMAN.

Cresylic acid from petroleum distillates. L. J. CATLIN (Ind. Eng. Chem., 1926, 18, 743—744).—Cracked petroleum distillates on washing with caustic soda yielded 0.007% of their volume of phenols. The oil was precipitated from the soda solution by saturation with hydrogen sulphide from still gases. The aqueous portion was brought to the composition corresponding to the normal sulphide by addition of further caustic soda and concentrated to b.p. 143°, when on cooling a further separation of oil took place and the residue could be converted into commercial 62% sodium sulphide. The phenol fraction distilled mainly between 195° and 227°; it gave tests for cresylic acid (Allen, "Commercial Org. Anal.," 4th ed., 3, 316) but contained no cresols, having d 0.995 to 1.013.

C. IRWIN.

See also A., Aug., 805, **Extinction of methane flames by diluent gases** (COWARD and HARTWELL). 807, **Catalytic oxidation of carbon monoxide** (HOSKINS and BRAY).

Determination of acetone. MARASCO.—See XX.

PATENTS.

Coal washing. A. ROBINSON, and SIMON-CARVES, LTD. (E.P. 252,475, 5.3.25).—The coal, prior to washing, falls on an inclined sieve which removes a portion of the fine coal. The sieve is of wedge shape $\frac{1}{2}$ in. mesh, fitted with springs, and is placed in the shoot to the washer. The fine coal is mixed with the drained slurry from the washer and the product is of suitable moisture content to be used as a fuel.

A. C. MONKHOUSE.

Briquetting. W. TYRRELL (U.S.P. 1,588,823, 15.6.26. Appl., 31.12.24).—A mixture of equal parts of caustic soda and diatomaceous earth is moistened with water and heated at 105° for $\frac{1}{2}$ hr. Two per cent. of this mass is then mixed with the

finely ground material to be briquetted and the mass compressed. S. PEXTON.

Operating vertical chamber ovens to produce water-gas. N. V. SILICA EN OVENBOUW MIJ., Assees. of C. OTTO & Co. (E.P. 240,468, 23.9.25. Conv., 25.9.24).—Vertical retorts or chamber ovens are provided with two coke-discharging doors each of which discharges coke from the half of the retort immediately above it. Coke is discharged intermittently and alternately from the two halves of the retort. In this way the coke mass within the retort is broken up and steaming of the retorts is more effective. S. PEXTON.

Preheating of fuel preliminary to carbonisation. J. RUDE (E.P. 252,988, 12.11.25).—The fuel entering a vertical retort is preheated in a chamber above the retort by circulating a portion of the waste gases from the combustion flues by a fan or injector through the chamber. The sensible heat of the coke may be used in place of the waste gases. An alternative method is to combine with the above a heat exchanger which is heated by the flue gases or by gases heated by the coke. The preheated fuel is fed into the retort through shoots which act as seals and are also jacketed by the waste gases. A. C. MONKHOUSE.

Gas-retort settings. H. J. TOOGOOD, and R. DEMPSTER & SONS (E.P. 253,676, 8.5.25).—In order to economise space and plant fittings retorts at the same height are connected in pairs to the same ascension pipe, there being ascension pipes at both ends of the retorts. An easily operated baffle or butterfly valve is provided to close the offtake from each retort, when discharging and charging the retort. S. PEXTON.

Manufacture of gas. WOODALL-DUCKHAM (1920), LTD., E. W. SMITH, and T. C. FINLAYSON (E.P. 253,702, 26.5.25).—In order to increase the efficiencies of water-gas manufacture and tar-cracking in vertical retorts it is proposed to divide the process into two stages. The minimum amount of steam to quench the coke is introduced into a number of the retorts, the tops of which are maintained at a lower temperature than usual. The remaining retorts are fed with broken coke and a liberal supply of steam is admitted. Water-gas is more efficiently made because the coke charge is not consolidated. Tar is sprayed on to the coke at a point where the temperature is suitable for cracking. S. PEXTON.

Apparatus for producing solid [carbonised] fuel. M. J. TRUMBLE (U.S.P. 1,586,131, 25.5.26. Appl., 9.2.24).—A retort has an opening for the introduction of carbonaceous material, which opening may be closed gas-tight. An eduction pipe extends through one end wall of the retort and has an open end adjacent to the other end of the retort. There are also means for heating the retort, and a plunger to force material from the retort into the open end of the eduction pipe. H. MOORE.

Coke-ovens. A. ROBERTS, Assr. to CHICAGO TRUST Co. (U.S.P. 1,588,469, 15.6.26. Appl., 20.11.21.

Renewed 5.2.26).—The ovens are heated by vertical flues each divided into an upper and lower chamber. Every chamber is provided with two air ports and one gas nozzle, the air ports being connected to separate regenerators which can be independently controlled. S. PEXTON.

Production of highly-active charcoal from wood. P. WÖHLER, Assr. to RHENANIA VER. CHEM. FABR. A.-G. (U.S.P. 1,588,868, 15.6.26. Appl., 1.9.21. Conv., 14.4.17).—Small pieces of wood are carbonised at 300–500° with the exclusion of air. The product is incorporated with alkali and heated at bright redness with the exclusion of air. S. PEXTON.

[Carbonisation] retort. F. PAVELIK (U.S.P. 1,589,217, 15.6.26. Appl., 22.12.22).—The retort consists of a rectangular casing within which a number of horizontal parallel conveyors operate separately over mechanically driven toothed rollers at opposite ends of the retort. Fuel fed into the retort drops on to the uppermost conveyor, which feeds it on to the next lower one. In this way a shallow layer of fuel can be carbonised at varying rates. S. PEXTON.

Apparatus for extracting volatile oils from solid substances. MCG. CLINE (U.S.P. 1,589,838, 22.6.26. Appl., 24.8.23).—The solid substance from which the volatile oil is to be distilled is admitted at the top of a retort and passes down over a series of stationary plates, being transferred by scrapers attached to a rotating shell surrounding the fixed plates. The spent material is discharged at the bottom of the retort. S. S. WOOLF.

Gas purification. W. H. FULWEILER, Assr. to U.S.I. CONTRACTING Co. (U.S.P. 1,589,749, 22.6.26. Appl., 27.2.25).—Alkaline solutions used in gas purification when foul are re-activated by the action of air, the concentration of thiosulphate being maintained above 20 g. per litre. S. I. LEVY.

Recovering ammonium sulphate [from coal-gas]. F. F. MARQUARD (U.S.P. 1,589,809, 22.6.26. Appl., 5.2.25).—The gas is passed through a closed sulphuric acid saturator in which the salt is made as usual and then through a secondary closed washer. The bath in the saturator is periodically neutralised while continuing the passage of the gas so as to remove pyridine. C. IRWIN.

Motor fuel. R. A. CARROLL and H. L. ELLIOTT (U.S.P. 1,587,899, 8.6.26. Appl., 31.1.20. Renewed 30.10.25).—The fuel consists of aromatic hydrocarbon distillates, free from sulphur, and petroleum distillates, both boiling not above 150°, and also a volatile monohydric alcohol, a readily volatile terpene, naphthalene, and water, the quantity of the last four substances being not more than 7% in all. The product is a homogeneous stable mixture. H. MOORE.

Transport and distillation of mineral oils, tar oils, and tars. G. E. HEYL (E.P. 253,436, 15.12.25).—Oil or tar is distilled in the tanks of tank

steamers or barges during transit. The tanks are heat-insulated and subdivided to permit of the concentration of the heating on portions at a time. Heating is effected by a steam coil or surface heat exchanger. Exhaust steam may be utilised in the initial stage, live steam being used after. The vapours may be used to preheat the raw material, being afterwards condensed and stored in separate compartments. H. MOORE.

Motor fuel for internal-combustion engines.

F. A. HOWARD, Assr. to STANDARD DEVELOPMENT Co. (U.S.P. 1,589,885, 22.6.26. Appl., 16.8.20).—A motor fuel comprises a knock-producing volatile hydrocarbon liquid containing absorbed ammonia. H. MOORE.

Gasoline-recovery apparatus. H. B. BERNARD, Assr. to SINCLAIR OIL AND GAS Co. (U.S.P. 1,584,504, 11.5.26. Appl., 20.6.24).—In the recovery of gasoline from natural gas by the absorption process, absorbed constituents are separated from the liquid absorbent in an exhausting tower provided with means for promoting contact and heat exchange between gas and liquid. A partition in the lower part of the tower divides it into a heated supply compartment, into which charged absorbent is introduced, and a discharge compartment opening upward into the tower. Liquid may be withdrawn from the supply compartment and discharged into the tower over the contact-promoting devices, and thence conducted to the discharge compartment. Gases and vapours are withdrawn from the upper end of the tower, and liquid from the discharge compartment. H. MOORE.

Apparatus for distilling hydrocarbons. M. J. TRUMBLE (U.S.P. 1,586,130, 25.5.26. Appl., 16.4.23).—Oil heated to a desired volatilisation temperature is delivered to a separator, the discharge of oil from which is regulated in proportion to the feed thereto. The vapour outlet of the separator is provided with a device for regulating the pressure within the separator, and means are provided for converting the expansive heat energy of the vapour products from the separator into mechanical energy. H. MOORE.

Apparatus for refining oil. M. J. TRUMBLE (U.S.P. 1,586,132, 25.5.26. Appl., 2.9.24).—An evaporator for treating petroleum oils comprises a cylinder, shafts supported on bearings projecting from each end of the cylinder, and having a common axis about which the cylinder rotates, and a tight casing enclosing the cylinder. Oil is delivered into the cylinder and oil vapour withdrawn from the casing. The bearings are electrically insulated from the casing, and an electromotive force is established between the ends of the cylinder. H. MOORE.

Continuous refluxing still. M. J. TRUMBLE (U.S.P. 1,586,133, 25.5.26. Appl., 8.9.24).—An apparatus for cracking oils comprises a still, a refluxing coil, to which vapours are passed from the still, and from which condensate is passed to the still, and a condenser, to which vapours are passed from the

still. The coil is contained in a chamber to which condensate from the condenser is passed. Surplus liquid from the coil chamber is returned to the still, and the vapours produced in the coil chamber are condensed in a separate condenser. H. MOORE.

Manufacture of light hydrocarbons. L. EDELEANU (U.S.P. 1,586,357, 25.5.26. Appl., 20.1.25. Conv., 17.12.24).—Mineral oils are converted into light hydrocarbons of lower b.p. by depriving them of the constituents soluble in liquefied sulphur dioxide, preparing a double compound of the oil by treating with aluminium chloride, adding gradually the double compound to mineral oil to be converted, and heating the mixture. H. MOORE.

Converting hydrocarbon oils into lower-boiling products. F. A. HOWARD, Assr. to STANDARD DEVELOPMENT Co. (U.S.P. 1,586,994, 1.6.26. Appl., 16.8.22).—Mercury is heated in a closed system to a temperature above 370°, and hydrocarbons are cracked by exposure to the indirect heat of the mercury vapour, the cracked products being withdrawn in vapour form and condensed. H. MOORE.

Apparatus for refining hydrocarbon materials.

F. M. FLOYD (U.S.P. 1,587,370, 1.6.26. Appl., 19.5.22).—The apparatus comprises a still and a reflux condenser, the lower end of which communicates with the still. Within the reflux condenser is a coil. An inlet pipe for the material to be distilled enters the condenser at the top, passes down, and is connected to the bottom of the coil, whilst an exit conduit leads from the top of the coil and out through the bottom of the condenser into the still, having an outlet near the bottom of the still. H. MOORE.

Process of treating hydrocarbons. R. CROSS (U.S.P. 1,587,491, 1.6.26. Appl., 9.2.23).—Petroleum oil is vaporised under pressure, and the vapours are passed through a mixture of bentonite and a salt of a metal having an affinity for the sulphur compounds of the oil, the mixture being maintained above the "dry point" of the oil. The vapours are subsequently condensed. H. MOORE.

Treating hydrocarbons and oils. L. B. CHERRY, Assr. to C. & C. DEVELOPING Co. (U.S.P. 1,588,308, 8.6.26. Appl., 11.11.19).—Oils are subjected to a cracking temperature at a cathode while being traversed by an ionising electric current flowing from an anode to the cathode. H. MOORE.

Conversion of high-boiling hydrocarbon oils into lower-boiling oils. P. J. SWEENEY, Assr. to STANDARD OIL Co. (U.S.P. 1,589,908, 22.6.26. Appl., 11.1.26).—Oils having a b.p. range similar to that of gasoline are produced by passing the higher-boiling oil continuously in a restricted stream through a zone in which it is brought to conversion temperature. The heated oil is discharged into one of a number of series of connected enlarged chambers, through which it flows at a slower rate, the temperature being maintained, and pressure maintained on the system. Liquid products are

withdrawn from a chamber remote from the one into which the oil first flows from the heating zone. Oil is passed through the chambers until substantial deposits of coke and asphalt are produced in the later chambers of the series, whereupon the oil is passed in the reverse direction through the chambers.

H. MOORE.

Process of manufacturing oil of a low boiling point from mineral heavy oils. T. MII, Assr. to K. ISOMURA (U.S.P. 1,590,640, 29.6.26. Appl., 19.1.23).—An aluminium hydrosilicate is impregnated with a soluble chloride to produce a catalyst for the manufacture of oils of low boiling point.

H. MOORE.

Process of treating hydrocarbons. J. R. McCONNELL (U.S.P. 1,590,841, 29.6.26. Appl., 27.7.25).—Light hydrocarbons containing a light-sensitive discolouring compound are treated to produce water-white hydrocarbons stable in colour by exposing to light to fix the colour of the discolouring compound and afterwards distilling.

H. MOORE.

Refining lubricating-oil stocks. J. W. WEIR (U.S.P. 1,581,369, 20.4.26. Appl., 14.5.25).—The oil is treated with sulphuric acid, settled, and most of the sludge removed. The oil stock is treated with a powdered solid adsorbent at a temperature sufficient to decompose the sludge present, liberating sulphur dioxide. Litharge is then added to the mixture, and the oil stock separated.

H. MOORE.

Process of manufacturing lubricating oils. J. W. WEIR (U.S.P. 1,581,370, 20.4.26. Appl., 9.11.25).—The oil stock is treated with sulphuric acid, the sludge removed, and the stock neutralised with alkali, which is then separated from the stock, to which further sulphuric acid is added, and the sludge settled and removed. The stock is then agitated with a powdered solid adsorbent at a temperature below that at which the sludge decomposes. The adsorbent and adsorbed matters are separated from the stock and a further quantity of a powdered solid adsorbent is added, the mixture heated to decompose the remaining sludge, with liberation of sulphur dioxide, and adsorbent and adsorbed material separated from the stock.

H. MOORE.

Method of using concentrated decolorising clays for refining lubricating oils. A. JURRISSSEN, Assr. to SIMPLEX REFINING Co. (U.S.P. 1,585,922, 25.5.26. Appl., 31.5.21).—Petroleum lubricating oil is treated first with sulphuric acid, then with decolorising clay, and subsequently neutralised with an alkali, *e.g.*, lime, the oil, acid, and alkali all being free from water.

H. MOORE.

Preparing a lubricating oil. W. D. RIAL (U.S.P. 1,587,859, 8.6.26. Appl., 2.11.25).—A vegetable oil, *e.g.*, castor oil, is treated with a carbocyclic compound capable of increasing its capillarity, *e.g.*, cresol, and then mixed with a mineral oil stock

containing a deodorant. A typical lubricant of this nature has the composition: 5% of castor oil, 5% of nitrobenzene, 1% of cresol, and 89% of light lubricating oil.

R. B. CLARKE.

Desulphurising [mineral] oils. E. M. JOHANSEN, Assr. to ATLANTIC REFINING Co. (U.S.P. 1,587,649, 8.6.26. Appl., 1.5.23).—Oils containing combined sulphur are mixed with oils containing free sulphur and the mixture is treated with alkali plumbite. The sulphur compounds react with the plumbite to form compounds which react with the free sulphur and remove it.

E. S. KREIS.

Process for treating petroleum emulsions. M. DE GROOTE, Assr. to W. S. BARNICKEL & Co. (U.S.P. 1,590,617, 29.6.26. Appl., 23.12.24).—The emulsion is subjected to the action of a water-insoluble salt of a mineral sulphonated oil.

H. MOORE.

Continuously separating [acid] petroleum sludge. I. HECHENBLEIKNER and T. C. OLIVER (U.S.P. 1,586,801, 1.6.26. Appl., 20.3.23).—Acid sludge is continuously separated into its hydrocarbon and acid constituents by subjecting it to the action of steam under pressure. The components are withdrawn in a mechanically mixed state, and are subsequently physically separated.

H. MOORE.

Distillation of solid bituminous fuels. H. ROSENTHAL, Assr. to J. PINTSCH A.-G. (U.S.P. 1,592,467, 13.7.26. Appl., 24.3.22. Conv., 19.8.20).—See E.P. 193,276; B., 1923, 342 A.

Gas-purification process. F. W. SPERR, JUN., Assr. to KOPPERS Co. (U.S.P. 1,592,648, 13.7.26. Appl., 8.12.21).—See E.P. 190,116; B., 1924, 164.

Gas-purification apparatus. F. W. SPERR, JUN., Assr. to KOPPERS Co. (U.S.P. 1,592,649, 13.7.26. Appl., 23.5.24. Renewed 3.3.26.)—See E.P. 204,058; B., 1924, 164.

Operating explosion motors. BADISCHE ANILIN- & SODA-FABR., Assees. of W. GAUS and F. LAPPE (U.S.P. 1,591,526, 6.7.26. Appl., 29.4.24. Conv., 8.5.23).—See E.P. 215,776; B., 1925, 662.

Separating and purifying [hydrocarbon] oil. W. E. TRENT, and TRENT PROCESS CORP. (U.S.P. 1,591,728, 6.7.26. Appl., 11.8.20).—See E.P. 167,738; B., 1922, 579 A.

Processes for dressing coal, lignite, and like materials. T. FRANZ (E.P. 240,799, 15.8.25. Conv., 1.10.24).

Apparatus for supplying coal dust to furnaces by means of compressed air. "KOHLENSTAUB" G.M.B.H. (E.P. 233,696, 4.5.25. Conv., 7.5.24).

Producing hydrogen (U.S.P. 1,588,860).—See VII.

Nitration of petroleum distillates (U.S.P. 1,588,027).—See XX.



III.—TAR AND TAR PRODUCTS.

Cresylic acid from petroleum distillate. CATLIN.—See II.

PATENTS.

Reclaiming tar and light oil [from aqueous emulsions]. W. F. DIETZSCH (U.S.P. 1,589,374, 22.6.26. Appl., 17.12.24).—The emulsions are heated to a temperature slightly above the boiling point of the light oils, but below that of water. The light oils distil over and are condensed, whilst the tar settles to the bottom of the aqueous layer, and is withdrawn.

L. A. COLES.

Transport and distillation of tar oils and tars (E.P. 253,436).—See II.

IV.—DYESTUFFS AND INTERMEDIATES.

Subsidiary dyes in commercial Agalma Black 10B. W. R. BRODE (Ind. Eng. Chem., 1926, 18, 708—712).—Spectrophotometric measurements on the exhaust liquors from a 15—16% dyeing of Agalma Black 10B in comparison with dyeings of the pure colour, 1-amino-8-naphthol-3:6-disulphonic acid-7-azobenzene, and 2-*p*-nitrobenzeneazo-1-amino-8-naphthol-3:6-disulphonic acid show that the red impurities consist almost entirely of 1-amino-8-naphthol-3:6-disulphonic acid-7-azobenzene. The characteristic blue colour developed in 10% sodium hydroxide with 2-*p*-nitrobenzeneazo-1-amino-8-naphthol-3:6-disulphonic acid was never obtained with these exhaust liquors from the commercial dye. Dyeings stronger than 16% leave an increasing amount of Agalma Black 10B relative to impurity in the mother liquors, although the impurity (1-amino-8-naphthol-3:6-disulphonic acid-7-azobenzene) has much less affinity for wool than Agalma Black 10B. The amount of dye absorbed by the wool from commercial Agalma Black 10B depends on the concentration in the solution from which the dyeing takes place. In general the amount of impurity present in commercial Agalma Black 10B varies from 1 to 2.5%. The absorption bands of 2-*p*-nitrobenzeneazo-1-amino-8-naphthol-3:6-disulphonic acid and 7-benzeneazo-1-amino-8-naphthol-3:6-disulphonic acid in neutral or slightly acid solution are almost identical, whilst 2:7-di-(*p*-nitrobenzeneazo)-1-amino-8-naphthol-3:6-disulphonic acid and pure Agalma Black 10B are also very similar in shade and reactions, although the former has a greener shade and more affinity for wool, and consequently would not concentrate in the dye-bath if present as impurity.

R. BRIGHTMAN.

See also A., Aug., 789, Adsorption phenomena (TESTONI); Surface actions (DUBRISAY).

PATENTS.

Manufacture of new [chromium compounds of azo] dyestuffs. SOC. CHEM. IND. IN BASLE (E.P. 235,862, 29.5.25. Conv., 17.6.24).—Dyes which contain chromium and dye animal fibres from an acid bath in fast yellow to orange and brown shades

are obtained by treating *o*-hydroxyazo-dyes (obtained from a nitrated *o*-hydroxydiazo-compound and an ester or arylide of acetoacetic acid) with an agent which parts with chromium, such as chromium oxide or its hydrates or salts. Thus 29.5 pts. of the azo-dye from diazotised 4-nitro-2-aminophenol and ethyl acetoacetate are suspended in 900 pts. of water and boiled under a reflux with a quantity of chromium formate corresponding with 22.5 pts. of chromium oxide (Cr₂O₃). When cool the liquid is made alkaline with dilute caustic soda and filtered. The dye separates from the filtrate as a yellow-brown powder dyeing wool from a sulphuric acid bath in fast reddish-yellow shades. The dye from 4-nitro-2-aminophenol-6-sulphonic acid and acetoacetanilide similarly yields an olive-brown powder dyeing wool in reddish-yellow shades, whilst that from 6-nitro-2-aminophenol-4-sulphonic acid and acetoacetanilide yields a brown powder dyeing reddish-yellow shades on wool. Azo-dyes from 4-nitro-2-aminophenol-6-carboxylic acid similarly yield dyes giving greenish-yellow shades on wool, whilst brown shades are obtained when the initial azo-dye is prepared from a nitrated *o*-hydroxydiazo-compound of the naphthalene series. Other arylides of acetoacetic acid may be used in place of acetoacetanilide.

R. BRIGHTMAN.

Manufacture of dyestuffs capable of being chromed. SOC. OF CHEM. IND. IN BASLE (E.P. 251,266, 15.4.26. Conv., 25.4.25).—The dyes described in E.P. 214,629 (cf. U.S.P. 1,521,206; B., 1925, 165) can be obtained in much higher yield by conducting the reduction with sulphide in the presence of an organic compound containing hydroxyl groups, such as dextrose, sucrose, glycerol, glycol, tannin, gallic acid, or sulphite-cellulose waste lye. Thus the concentrated suspension of the dye obtained from 150 pts. of α -naphthol and 295 pts. of 1-amino-2-naphthol-4-sulphonic acid is mixed, while stirring, with 25 pts. of dextrose or glycerol, 145 pts. of 30% sodium hydroxide, and 360 pts. of sodium sulphide crystals. The mixture is stirred at the ordinary temperature until the sulphide has disappeared, when it is diluted with water and the dyestuff salted out.

R. BRIGHTMAN.

Manufacture of colouring matters and dyeings therewith. J. Y. JOHNSON. From BADISCHE ANILIN- & SODA-FABR. (E.P. 253,659, 16.4.25).—Chromium derivatives soluble in water which have the property of giving direct dyeings of excellent fastness on cotton or other cellulose fibres, natural or artificial, are obtained from direct azo dyes containing groups which enable them to be chromed, for instance, azo dyes containing two radicals of an *o*-hydroxy-carboxylic acid in their molecule. The dyes may be mixed with a soluble chromium salt and the mixture used for dyeing without further treatment. Alternatively the dye-bath may be prepared from the dyes and the chromium salts separately. Chromium fluoride, acetate, oxalate, or formate may be used, or complex chromium salts containing chromium both as an anion and a cation. For instance 10 pts. of the azo dye from 4:4'-diamino-

stilbene-2:2'-disulphonic acid and 2 mols. of salicylic acid, dissolved in 400 pts. of water with 5 pts. of sodium acetate crystals, are boiled for about 3 hrs. with 100 pts. of a chromium salt solution, containing about 10 pts. of chromic oxide (Cr_2O_3). The solution is filtered if necessary and the dye salted out. For dyeing, 100 pts. of cotton are treated in a hot bath containing 3 pts. of the chromium compound with a little Glauber's salt or common salt for an hour, or manipulated for several hours at the ordinary temperature. Fast orange shades are obtained. Examples of other methods of preparing and applying the dye are given. The dye from 2 mols of *p*-amino-sulphosalicylic acid (obtained by sulphonating *p*-aminosalicylic acid with 23% oleum) and 1 mol. of 5:5'-dihydroxy-2:2'-dinaphthylcarbamide-7:7'-disulphonic acid gives red shades, the analogous dyes from 5:5'-dihydroxy-2:2'-dinaphthylamine-7:7'-disulphonic acid and from *o*-amino-*p*-sulphosalicylic acid give violet shades. Violet shades are also obtained with the dye from 1 mol. of benzidine-2:2'-disulphonic acid and 2 mols. of 2-(4'-hydroxy-3'-carboxyphenyl)-amino-5-naphthol-7-sulphonic acid and with the dye obtained from 1 mol. of the latter acid and 1 mol. of 4-amino-4'-hydroxy-5'-carboxy-diphenylamine-2-sulphonic acid. Blue shades are obtained with the dye from 1 mol. of the aminonaphtholsulphonic acid derivative and 1 mol. of 4:4'-diaminostilbene-2:2'-disulphonic acid. Yellow to orange shades are obtained with the dyes from 1 mol. of benzidine and 2 mols. of salicylic acid or *m*-cresotic acid and from 2 mols. of salicylic acid and 1 mol. of *oo'*-dianisidine or *pp*-diaminodiphenylcarbamide.

R. BRIGHTMAN.

Manufacture of monoazo-dyestuffs or intermediate compounds for manufacture of disazo or polyazo-dyestuffs. A. G. BLOXAM. From CHEM. FABR. GRIESHEIM-ELEKTRON (E.P. 253,763, 23.9.25).—Monoamines of the diphenyl series, especially their nitro- and acetamido-substituted derivatives, are diazotised and coupled with a 1-aryl-5-pyrazolone-sulphonic acid, a naphtholsulphonic acid, or an aminonaphtholsulphonic acid, giving monoazo-dyes which possess valuable properties, especially fastness to milling, and are also useful intermediates for disazo- or polyazo-dyes. Thus *pp'*-dichloroaminobenzidine, m.p. 95–96°, diazotised at 5–10° and coupled alkaline with *p*-sulpho-*o*-chlorophenylmethylpyrazolone gives a yellow wool dye, with 2:6-naphtholsulphonic acid a reddish-brown dye, and with 2-phenylamino-8-naphthol-6-sulphonic acid a brown dye. Other substituted amino-compounds of monoamines of the diphenyl series may be used, with the exception of monoamines containing the substituent group NHR, where R is an aryl group. Sulphonated monoamines of the diphenyl series may also be used, but in this case the coupling component should be unsulphonated.

R. BRIGHTMAN.

Manufacture of indigoid dyestuffs containing sulphur. FARBW. VORM. MEISTER, LUCIUS, & BRÜNING (E.P. 251,293, 7.4.25. Conv., 9.4.24).—Indigoid dyes containing sulphur are obtained by

heating an *O*-acyloxythionaphthen with a 2:3-diketodihydrothionaphthen-*a*-anil, either in the presence or absence of a solvent or diluent. The new dyes are distinguished by the variety and fastness of their shades. The dye from 3-acetoxythionaphthen (3.8 pts.) and 5-chloro-7-methyl-2:3-diketodihydrothionaphthen-*a*-(*p*-dimethylamino)anil (6.6 pts.) at 150° gives bluish-red shades on cotton whilst the dye obtained by boiling 4.2 pts. of the same anil with 3 pts. of 5:6-benzo-3-acetoxythionaphthen and 300 pts. of acetic acid until there is no further separation of dye, dyes cotton in the vat a violet shade.

R. BRIGHTMAN.

Dyestuffs and dyeing of acetyl silk. SCOTTISH DYES, LTD., E. G. BECKETT, J. THOMAS, and R. TONKIN (E.P. 253,584, 16.3.25. Addn. to 231,260; cf. B., 1925, 393).—In place of the alkali sulphide used in the original patent, an alkaline-earth sulphide may be used, especially calcium hydrogen sulphide. Thus in place of 168 pts. of sodium sulphide crystals, 73 pts. of calcium hydrogen sulphide may be used.

R. BRIGHTMAN.

Dye compositions [for dyeing silk]. J. M. MATTHEWS, Assr. to GLORIENT, INC. (U.S.P. 1,588,482—4, 15.6.26. Appl., [A] 29.5.24, [B] 8.11.24, [C] 2.9.25).—Non-hygroscopic powders which readily yield solutions suitable for dyeing silk contain (A) an acid dye not precipitated in the presence of aluminium sulphate and potassium bitartrate, a substance which supplies free acid when dissolved in water, and a levelling agent; (B) a soluble organic acid, a levelling agent, and an acid dye not precipitated by the acid and the levelling agent; or (C) an acid dye, sodium bifluoride, and a levelling agent.

L. A. COLES.

Manufacture of vat colouring matters. J. Y. JOHNSON. From BADISCHE ANILIN & SODA FABR. (E.P. 254,476, 2.6.25).—See F.P. 599,038; B., 1926, 577.

Production of new insoluble azo dyestuffs in substance or on the fibre. W. CARPMAEL. From FARBENFABR. VORM. F. BAYER & CO. (E.P. 254,578, 29.10.25).—See U.S.P. 1,576,322; B., 1926, 432.

Manufacture of diaminodiarlyldialkylmethanes. B. HOMOLKA, Assr. to GRASELLI DYESTUFF CORP. (U.S.P. 1,591,384, 6.7.26. Appl., 19.9.23. Conv., 29.9.22).—See E.P. 204,722; B., 1924, 412.

Preparing halogenated oxythionaphthens. E. HOFFA, Assr. to GRASELLI DYESTUFF CORP. (U.S.P. 1,592,210, 13.7.26. Appl., 5.4.24. Conv., 28.4.23).—See E.P. 215,021; B., 1925, 438.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

"Immune" [cotton] yarn. M. FAHRLÄNDER (Textilber., 1926, 7, 463–464).—Immune cotton yarn (cf. E.P. 246,609; B., 1926, 270) may be subjected to processes of singeing, de-sizing, scouring, bleaching, and mercerising as employed for cotton. It has dyeing properties similar to those of cellulose

acetate silk and a special range of Imacol dyes capable of dyeing immune yarn in shades fast to light and washing but having no affinity for cotton is now available. Imacol dyes (Sandoz) may be used with direct cotton dyes in the same dye-bath.

A. J. HALL.

Influence of curtailed time of heating up on the constitution of sulphite pulp. O. ROUTALA and J. SEVON (Zellstoff u. Papier, 1926, 6, 257—259).—Much can be done by suitable manipulation of the temperature at different stages to shorten the total time of digestion of sulphite pulp, particularly the very prolonged operation of the Mitscherlich process. Experimental digestions showed that the early stage of heating-up to the boil, which is generally extended over 4 hrs., can be curtailed to 20 min. if, after reaching 105°, the charge be held at this for 1 hr., then again at 110° for 2 hrs., and finally at 120° for 1 hr. before proceeding to the digestion proper at 130—135°. The object of the slow heating-up is to give time for the penetration of the wood by the liquor, but in the region slightly above 100° the velocity of the chemical reactions is still low, whilst the diffusion velocity is very much greater than at the usual heating-up stage. Thus provided the chemical reactions are not unduly hastened by proceeding too rapidly to the full digestion temperature, no trouble is to be feared from defective penetration by omitting the slow heating-up stages.

J. F. BRIGGS.

Loading and sizing of paper. H. ROSCHIER (Papierfabr., 1926, 24, 348—350, 363—365, 384—388).—Experiments on clay-retention efficiencies were carried out by means of sheets made on the Lampen mould from unbeaten sulphite pulp with which the clay was mixed with various additions. In the presence of 2% of aluminium sulphate only, the yield of clay in the paper decreases as the dilution of the pulp is increased. Other conditions being constant, the yield of clay increases with the proportion of aluminium sulphate until the latter reaches 4—5% of the dry weight of cellulose, depending probably on the precipitation of the hydroxide. Excess of aluminium sulphate, that is of acidity, is unfavourable, but if acidity be reduced by the addition of sodium hydroxide the yield of clay in the paper with a constant proportion of aluminium sulphate increases to a maximum when the p_H value is 5.6. If the p_H value be maintained constant at 5.5 by the addition of sodium hydroxide while the proportion of aluminium sulphate is increased, the maximum efficiency of clay retention is reached between 6 and 8% of aluminium sulphate on the cellulose. Under these conditions increased retention efficiencies are obtained with increased proportions of clay added, up to about 30% of clay, above which the percentage retention quickly falls. Starch when added as a jelly largely increases the retention of clay, but a clear filtered solution of starch has no effect. Resin size has a favourable influence on the retention of clay, so long as the proportion of aluminium sulphate is quite low, but with larger proportions of alum the effect of size is not nearly so

pronounced as that of plain sodium hydroxide. The retention of clay by the pulp is primarily and mainly a mechanical filtration process but colloidal influences play a minor part. The favourable influence of beating is most marked. High dispersion of the clay particles is unfavourable to retention, and in fractionated clays the coarser fractions give the highest yields in the paper. This influence of the size of particle is, however, largely mitigated by the beating of the pulp, so that finely beaten pulps favour the retention of the finer clay particles. The retention efficiency of talc is very much better than that of clay, especially with little or no alum present. As the percentage of aluminium sulphate is increased the clay responds much more favourably than the talc and the difference becomes less marked.

J. F. BRIGGS.

Errata.—B., 1926, April 16, p. 267, col. 2, line 24 from bottom, for "1926, 1, 1—6" read "1926, 7, 1—6"; also p. 268, col. 1, lines 3 and 6 from top, for "isosaccharic" read "isosaccharinic."

See also A., Aug., 781, *x-Ray investigations on cellulose* (HERZOG). 793, *Comparison of heat effect of swelling and mercerisation of cellulose with absorption and x-Ray spectrographic experiments* (KATZ); *Swelling of cellulose* (HERZOG).

PATENTS.

Decolorising solutions of cellulose derivatives. AKT.-GES. F. ANILIN-FABR. (E.P. 245,078, 12.11.25. Conv., 23.12.24).—A 10% solution of coloured (dyed) celluloid film in ether-alcohol, acetone, ethyl acetate, etc., is stirred with a substance containing silicic acid and having adsorbent surface activity, e.g., fuller's earth or Florida bleaching earth. The quantity of decolorising agent may be 20% of the weight of the film, and after stirring for 2—3 hrs. the earth is allowed to settle for a similar length of time and the decolorised solution clarified by filtration. Alternatively a 5% solution of the coloured celluloid may be forced through a layer of fuller's earth, the solution coming through decolorised.

J. F. BRIGGS.

Process of making acetylated nitrocellulose. H. P. BASSETT and T. F. BANIGAN, Assrs. to MEIGS, BASSETT & SLAUGHTER, INC. (U.S.P. 1,586,437, 25.5.26. Appl., 11.5.23).—Nitrocellulose of high nitrogen content is dissolved in a solvent adapted under the influence of a suitable catalyst to acetylate the nitrocellulose; the solution cooled below 15°, a suitable catalyst is added to the cooled solution, and the temperature is maintained below 15° until acetylnitrocellulose is formed.

J. F. BRIGGS.

Nitrocellulose composition. E. R. LITTMANN, Assr. to COMMERCIAL SOLVENTS CORP. (U.S.P. 1,589,608, 22.6.26. Appl., 17.10.25).—The composition consists of nitrocellulose and tri-*n*-butyl phosphate.

C. IRWIN.

Viscose artificial silk fibres. ERSTE BÖHMISCHE KUNSTSEIDEFABRIK A.-G. (F.P. 600,309, 3.7.25).—

Capillary-active materials such as gum, mucin, proteins, pectin, betaine, urethanes, alcohols, fatty acids, etc., are added to the precipitation baths.

B. W. CLARKE.

Low-temperature explosion process of disintegrating wood and the like. W. H. MASON (U.S.P. 1,586,159, 25.5.26. Appl., 6.7.25).—Lignocellulose material is introduced into a high-pressure chamber together with a moist fluid, and a compressed gas is introduced into the chamber at a pressure higher than that of the moist fluid. The contents of the chamber are discharged through a relatively restricted outlet, whereby the material is disintegrated without being subjected to temperatures which would char or discolour it. J. F. BRIGGS.

Improving artificial silk, staple fibres, and textiles made therewith. H. KARPLUS (U.S.P. 1,591,922, 6.7.26. Appl., 2.6.24. Conv., 11.1.24).—See E.P. 234,618; B., 1925, 707.

Utilising the skins of chondropterygians and plagiostomes. A. EHRENREICH and K. BENDIXEN (U.S.P. 1,592,189, 13.7.26. Appl., 4.6.24. Conv., 7.6.23).—See E.P. 235,050; B., 1925, 626.

Nitration of petroleum distillates (U.S.P. 1,588,027).—See XX.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Comparison of "wetting-out" agents [for textile processes]. J. AUERBACH (Textilber., 1926, 7, 681—685).—The wetting-out powers of various commercial products were compared by determining the times required for a square of dry raw woollen fabric to sink when placed on the surface of their aqueous solutions. Oranit, Nekal A pdr., and Neomerpin N are particularly efficient wetting-out agents, sodium carbonate, alcohol, Turkey-red oil, Eufullon, and Verapol being considerably less effective. Most of the wetting-out agents were more effective in hot solutions. A. J. HALL.

Indigosol O [in dyeing and printing]. G. FRIEDLÄNDER (Textilber., 1926, 7, 697—698).—Details of numerous large-scale processes for printing and dyeing indigo effects on fabrics by means of Indigosol O (cf. Indigosol DH, Vaucher and Bader, B., 1924, 864) are described. Fabric is satisfactorily dyed by slop padding with a solution containing 80 g. of Indigosol O, 835 g. of water, 50 g. of 8% gum tragacanth, 20 g. of a 10% β -naphthol solution, and 15 g. of sodium nitrite, drying in a hot-flue or on drying cylinders, and passing the dried fabric during 10—30 sec. through a developing bath at 20° containing 20 c.c. of sulphuric acid of 66° B. (d 1.84) per litre and then thoroughly washing it free from acid. It is recommended to use 1.2, 1.5, 2.0, 2.5, and 3.0% of sodium nitrite with 1—4, 4—8, 9—11, 12—15, and 16—20% of Indigosol O respectively, the ratio between the amounts of these substances used in the padding liquor being of considerable importance. The presence of β -naphthol

increases the stability of the padding liquor. An addition of an oxidisable acid such as formic acid to the developing bath reduces the liberation of obnoxious nitrogen oxide vapours, and drying of the padded fabric may be less complete if salt or Glauber's salt is added to the padding liquor. Very thick cotton and half-linen fabrics are not padded but treated in a jig for $\frac{1}{2}$ hr. at 20—25° with a solution containing 40 pts. of Indigosol O, 20 pts. of sodium nitrite, 180 pts. of calcined sodium sulphate, 5 pts. of Turkey-red oil, and 1000 pts. of water, then evenly squeezed, entered directly into the acid developing bath, afterwards neutralised with a dilute solution of sodium carbonate, washed, and dried. A satisfactory "steam" process consists of padding fabric with a solution containing 100 pts. of Indigosol O, 705 pts. of water, 50 pts. of an 8% solution of gum tragacanth, 15 pts. of ammonium thiocyanate, 80 pts. of a 10% solution of sodium chlorate, and 50 pts. of a 1% solution of ammonium vanadate, or 80 pts. of Indigosol O, 20 pts. of ammonium chloride (or ammonium thiocyanate), 10 pts. of sodium chlorate, 10 pts. of sodium ferrocyanide, and 880 pts. of a suitable thickening, then drying in a hot flue (or on drying cylinders having the first few cylinders lapped with fabric), and steaming in a Mather-Platt or in a closed steaming chamber (particularly suitable for the last-named padding solution) for 2—15 min. Indigo effects may also be obtained by the usual methods for producing aged Aniline Black using a padding liquor containing 100 g. of Indigosol O, 555 g. of water, 50 g. of glycerol, 10 g. of Turkey-red oil, 25 g. of a 50% solution of gum, 200 g. of ammonium chlorate of 15° B. (d 1.115), 40 g. of ammonium oxalate, and 40 g. of a 1% solution of ammonium vanadate. It is possible to use padding liquors containing Indigosol O and Katanol W or tannic acid or direct cotton dyes or chrome colours, and fabrics printed with Indigosol O pastes may be overprinted with Aniline Black.

A. J. HALL.

Griesheim ∇ Naphthol AS red pigments in dyeing and printing. W. KIELBASINSKI (Textilber., 1926, 7, 611—612).—Rapid Fast Red B is a mixture of 5-nitro-2-aminoanisole (the nitrosoamine), Fast Red Base B, and Naphthol AS; Rapid Fast Red BB is a mixture of 5-nitro-2-aminoanisole (nitrosoamine), Fast Red Base B, and Naphthol AS.BS; Rapid Fast Red 3 GL is a mixture of *o*-nitro-*p*-chloroaniline (nitrosoamine) and Naphthol AS; Rapid Fast Red GL is 3-nitro-*p*-toluidine (nitrosoamine) and Naphthol AS; Rapid Fast Red GZ is 2,5-dichloroaniline (nitrosoamine) and Naphthol AS; Rapid Fast Orange RG is *o*-nitroaniline (nitrosoamine) and Naphthol AS; Rapid Fast Blue is dianisidine (nitrosoamine) and Naphthol AS (cf. Rowe and Corbisley; B., 1925, 797). In dyeing loose cotton with Naphthol AS colours, maximum fastness to rubbing is obtained only when the fibres prepared with naphthol are thoroughly washed with water (an alkaline solution of sodium chloride has been recently recommended) before coupling with the diazo-component, and the resulting dyeing should

be after-treated with a hot solution of caustic soda. Naphthol AS couples less rapidly than β -naphthol with diazo-compounds. A. J. HALL.

Printing nitrosophenol dyestuffs [on fabrics]. P. WENGRAF (Textilber., 1926, 7, 447—448).—Deep dark green, reddish mode, and dark tobacco-brown shades are obtained by printing fabric prepared with β -naphthol with pastes containing an organic acid, sodium nitrite, and a salt of iron, nickel, or chromium respectively, the fabric being afterwards steamed for 5 min. in an air-free Mather-Platt. Suitable printing pastes contain 820 g. of an acetic acid and gum tragacanth thickening, 100 g. of a solution of iron acetate of 14° B. (d 1.108), nickel acetate of 16° B. (d 1.125), or chromium acetate of 11° B. (d 1.083), 30 g. of glycerol, and 50 g. of sodium nitrite. Attempts to prepare more stable printing pastes by using ammonium salts instead of acetic acid were unsuccessful, the rate of dissociation of such salts during steaming being too slow. A 2.2% solution of β -naphthol is suitable for preparing the fabric before printing. The resulting dyeings (colour lakes) have a good affinity for basic dyes. Coloured discharges may be obtained by means of sodium hyposulphite and certain basic, vat, and sulphur dyes. A. J. HALL.

Comparison of maize and potato starches for textile finishing. W. EKHard (Z. Spiritusind., 1926, 49, 196—197).—Potato starch contains much less fat and protein than maize starch and yields more viscous aqueous solutions. The viscosities of 5% solutions of potato, maize, and wheat starches are as 3.57 : 1.17 : 1.00, and a solution containing 150 g. of maize starch and 2850 g. of water has nearly the same viscosity as a similar solution containing only 100 g. of potato starch to 2900 g. of water. Aktivin (cf. Feibelmann, B., 1926, 484) attacks potato starch more rapidly than maize starch, and textile finishing pastes prepared by the action of Aktivin on potato starch are about one-half as viscous as similar pastes prepared from maize starch. Biolase and Diastafor, Degomma, and Novo Fermasol liquefy potato starch much less rapidly, equally, and slightly less rapidly respectively than maize starch. Potato starch has better binding properties when used in the weighting of textile materials. It is very difficult to prepare solutions of maize starch free from gelatinised "lumps" which are undesirable in finishing pastes. A. J. HALL.

PATENTS.

Mordanting and dyeing of wool. C. S. BEDFORD (E.P. 253,662, 23.4.25).—Wool is mordanted by means of a dichromate and sodium thiosulphate, so that the dichromate is completely reduced to chromium hydroxide, since a mordant in this state gives the fastest shades to light, milling, and potting with suitable mordant dyes; in most cases the resulting shades are brighter and deeper than similar shades on wool mordanted by the usual methods. For example, 500 lb. of wool are treated for 20 min. at 90—93° with a solution containing 10 lb. of sodium dichromate, then 15 lb. of sulphuric acid are added,

and, after a further 20 min., 5 lb. of sodium thiosulphate and $\frac{1}{4}$ — $\frac{1}{2}$ % (calc. on the weight of wool) of borax or $\frac{1}{2}$ —1% of sodium acetate; the mordanting is completed within a further 30 min. The addition of borax or sodium acetate prevents the deposition of sulphur. Subsequently the mordanted wool is treated in the same or a separate bath at 60—93° with a mild alkali such as sodium carbonate or ammonia whereby the mordant in the wool is completely converted into chromium hydroxide. The wool may frequently be dyed afterwards in the exhausted mordanting liquor. A. J. HALL.

Printing of fabrics. C. DREYFUS, Assr. to AMER. CELLULOSE & CHEMICAL MANUF. CO., LTD. (U.S.P. 1,588,951, 15.6.26. Appl., 20.9.24).—Union fabrics containing fibres of a cellulose derivative are printed with a mixture containing a solvent for the cellulose derivative, an inert powder, and a thickening agent, the printed fabric being maintained at a temperature not exceeding 125° until at least a portion of the cellulose derivative in the printed parts is removable by washing with water. A. J. HALL.

[Apparatus for] treatment of textile goods with liquids. A. W. SCHMID-KOECHLIN (E.P. 245,783, 7.1.26. Conv., 9.1.25).

[Machines for] calico printing. A. CROMPTON (E.P. 254,441, 27.4.25).

Dyeing of acetyl silk (E.P. 253,584).—See IV.

VII.—ACIDS; ALKALIS; SALTS; NON-METALLIC ELEMENTS.

Analysis of sulphur dioxide in the presence of excess air. E. D. RIES and L. E. CLARK (Ind. Eng. Chem., 1926, 18, 747).—To determine a small quantity of sulphur dioxide in air, a measured volume of the air is passed through a 4-bulb Mitscherlich absorber containing 10 c.c. of 10% sodium hydroxide solution 0.002M in stannous chloride. The solution is washed into a flask, diluted to 50 c.c., treated with 50 c.c. of 12N-hydrochloric acid and 2 c.c. of carbon tetrachloride as indicator, cooled, and titrated with 0.003M-potassium iodate solution until the pink colour in the indicator disappears. From the amount of iodate used is deducted that consumed in a blank test on the reagents and the remainder is calculated to sulphur dioxide. Low and erratic results were obtained with the following absorbents: solutions of iodine, sodium peroxide, sodium hypochlorite, acid potassium dichromate, acid permanganate, iodine and sodium hydrogen carbonate, and solid lead peroxide. The use of glycerol and sodium hydroxide gave poor results when only traces of sulphur dioxide were present; 5% of glycerol did not prevent oxidation and 50% gave too high a blank (cf. Haller, J.S.C.I., 1919, 52 τ , and Berl, B., 1921, 580A). A. R. POWELL.

Absorption and desorption of ammonia in a coke-packed column. T. K. SHERWOOD and

A. J. KILGORE (Ind. Eng. Chem., 1926, 18, 744—746).—The capacity coefficient of a coke-packed column for the absorption of ammonia from an ammonia-air mixture by water and the stripping of ammonia from aqueous solution by air was determined. The rate of liquor feed was maintained constant and the gas and liquor temperatures approximately so, but the gas velocity was varied. The capacity coefficient, *i.e.*, g. of ammonia diffusing per hr. per c.c. of packed column per 1 atm. difference in partial pressures of ammonia in gas and over solution, increased with the gas velocity in a linear relationship. Values for absorption and desorption were identical within the limits of experimental error and it is thought therefore that data obtained for the two processes should be interchangeable. C. IRWIN.

Separation of copper and ferrous sulphates by crystallisation. G. AGDE and H. BARKHOLT (Z. angew. Chem., 1926, 39, 851—855).—From a phase-rule study of the system copper sulphate-ferrous sulphate-water it is shown that the triclinic mixed crystal phase consisting of 95—100% $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ and 5—0% $\text{FeSO}_4 \cdot 5\text{H}_2\text{O}$ does not exist, the solid phase in equilibrium with a solution containing 35—40% of copper sulphate and less than 6% of ferrous sulphate being pure $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$. From solutions richer in iron the monoclinic mixed crystal phase containing 61—62% $\text{CuSO}_4 \cdot 7\text{H}_2\text{O}$ crystallises out on evaporation or cooling. On the ferrous sulphate side a continuous series of monoclinic mixed crystals containing $\text{CuSO}_4 \cdot 7\text{H}_2\text{O}$ and $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ in molecular ratios varying from 1:50 to 1:0.66 crystallises out. The latter is identical with the double salt described by Pisani as $3\text{CuSO}_4 \cdot 7\text{H}_2\text{O} \cdot 2\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$; it appears, however, not to be a true double salt, but simply the limiting solid solution. Recrystallisation of mixed crystals of any composition invariably yields crystals poorer in copper sulphate and a correspondingly richer mother liquor. For technical purposes pure copper sulphate can be obtained by evaporation and cooling only from solutions containing 35—40% of copper sulphate and less than 6% of ferrous sulphate and even then only when the solution is thoroughly agitated during cooling. By isothermal evaporation of solutions of copper sulphate containing only small proportions of iron, more than half the copper salt may be obtained in the form of fine crystals between 50° and 56°. When, however, the composition of the solution reaches the region of the mixed crystal phase, then the copper sulphate is contaminated with these crystals. The crystallisation operation may be controlled by determinations of the ferrous sulphate content of the solutions by titration with permanganate combined with a determination of the specific gravity. Graphs are given showing the solubility isotherms and cooling curves of the system and the relation between sp. gr. and composition of the solution. A. R. POWELL.

Calcination rates of limestone. W. A. GILKEY (Ind. Eng. Chem., 1926, 18, 727—728).—Curves showing the relation between the temperature of calcination of limestone and the time required for

complete conversion into oxide, and between the temperature of calcination and the percentage conversion in 1 min. are constructed, based on the results obtained by heating small quantities of limestone in a current of air in an electric furnace. In all cases the rate of conversion into oxide varied with the pressure of carbon dioxide, but, under comparative conditions, it was found that the rate of complete conversion at 750° is about 2.3 times, at 850° about 12 times, and at 1000° about 60 times that at 700°.

A. R. POWELL.

See also A., Aug., 787, Is orthoboric acid volatile in steam? (NASINI). 791, Rapid method of dialysis, and application to preparation of dialysed ferric hydroxide (FABRE and PENAU). 798, Thermal dissociation of calcium and magnesium carbonates (BÄCKSTRÖM). 804, Electrolytic formation of ammonium persulphate (ESSIN).

Hydrogen from water-gas. EVANS and NEWTON.—See II.

Electrolysis of sodium chromate with a mercury cathode. STSCHERBAKOV and ESSIN.—See XI.

PATENTS.

Production of concentrated nitric acid from waste acids. H. N. LENTZ, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,590,043, 22.6.26. Appl., 20.12.21).—Waste acid from nitration, free from aromatic compounds and containing more nitric acid than nitrosulphuric acid, is denitrated by steam in a packed tower. Concentrated nitric acid is condensed hot from the exit gases. The remainder of these, consisting largely of nitrogen peroxide, passes on through a cooling coil to further towers in which it is converted into dilute nitric acid which is returned to the process. C. IRWIN.

Apparatus for producing sulphurous acid gases. I. HECHENBLEIKNER, Assr. to CHEM. CONSTRUCTION Co. (U.S.P. 1,590,622, 29.6.26. Appl., 1.4.24).—The apparatus consists of a combustion chamber for holding liquid sulphur, with means for introducing an oxidising fluid, including a central inlet and a deflecting hood to direct the fluid downward on to the surface of the sulphur, the level of which is varied according to the concentration of gaseous sulphur dioxide it is desired to produce. H. ROYAL-DAWSON.

Ammonia distillation. J. S. UNGER (U.S.P. 1,581,367, 20.4.26. Appl., 22.12.24).—A distillation apparatus comprises a distilling column, a lime vessel, and a grate for supporting lime in the bottom of this vessel. Liquor may be passed from the distilling column to the bottom of the lime vessel, and up through the grate and the lime. The liquor from the lime vessel above the lime charge may be delivered to a lime leg, and by an overflow from the lime leg back to the column. H. MOORE.

Purification of gases for ammonia synthesis. G. CLAUDE, Assr. to LAZOTE, INC. (U.S.P. 1,589,628,

22.6.26. Appl., 25.3.22. Conv., 25.3.21).—Carbon monoxide and oxygen are removed from the nitrogen-hydrogen mixture to a practically complete extent by passing the gases over a heated catalyst. The process is carried on under pressure in an apparatus resembling the converter in which ammonia synthesis is performed.
C. IRWIN.

Process of producing alkali aluminates. RHENANIA VEREIN CHEM. FABR. A.-G. (E.P. 241,232, 12.10.25. Conv., 13.10.24).—Pulverised bauxite (100 pts.) containing 55% Al_2O_3 and 3% SiO_2 is mixed with 82 pts. of sodium sulphate and 5.5 pts. of calcium carbonate and heated to incandescence at 1800° in a rotary furnace heated with gas, steam being passed in at the same time.
H. ROYAL-DAWSON.

Method of treating limestone. F. C. MATHERS and H. B. BRISCOE (U.S.P. 1,588,253, 8.6.26. Appl., 14.7.25).—Dolomitic limestone is mixed with 0.6% by weight of potassium chloride or sodium sulphate and calcined for 2 hours at 1100° . The quicklime obtained is ground and converted into the dry hydrate by addition of a calculated quantity of water.
R. B. CLARKE.

Production of calcium arsenate. H. M. SCHLEICHER, Assr. to AMER. METAL Co., LTD. (U.S.P. 1,588,499, 15.6.26. Appl., 11.11.24).—Dry unslaked lime is added to a heated solution of alkali arsenate.
H. ROYAL-DAWSON.

Method of making arsenates. H. P. BASSETT and E. C. LATHROP (U.S.P. 1,588,691, 15.6.26. Appl., 10.4.24).—Arsenious compounds are oxidised to arsenates by treatment with chlorine in the presence of a base forming a soluble chloride and an almost insoluble arsenate. The latter is subsequently treated with a compound, the cation of which forms a more soluble arsenate or a mixture of more soluble arsenates, and the anion of which combines with the base of the insoluble arsenate to form an insoluble compound.
H. ROYAL-DAWSON.

Method of making potassium ferricyanide. G. BARSKY, Assr. to AMER. CYANAMID Co. (U.S.P. 1,589,041, 15.6.26. Appl., 2.10.25).—A small amount of alkali is added to a solution of potassium ferrocyanide, which is afterwards subjected to oxidation.
H. ROYAL-DAWSON.

Separation of sodium chloride from mixed salts. C. E. DOLBEAR (U.S.P. 1,589,519, 22.6.26. Appl., 25.4.25).—The mixed salts are subjected to the action of cold water for a limited period, after which the undissolved salts are separated from the brine.
H. ROYAL-DAWSON.

Reclaiming spent pickling solutions. H. S. MARSH and R. S. COCHRAN, Assrs. to AMER. COPPERAS Co. (U.S.P. 1,589,610, 22.6.26. Appl., 8.7.25).—Fresh acid is added to the solution of iron salts in weak sulphuric acid and the ferrous sulphate removed from solution.
C. IRWIN.

Process for making anhydrous zinc chloride. N. C. CHRISTENSEN (U.S.P. 1,590,229, 29.6.26. Appl., 7.6.23).—Dry lead chloride is heated with metallic zinc.
H. ROYAL-DAWSON.

Increasing the density of finely-divided material [soda ash]. E. T. ASPLUNDH, Assr. to PITTSBURGH PLATE GLASS Co. (U.S.P. 1,590,795, 29.6.25. Appl., 22.9.24).—Light pulverised hydrated soda ash is subjected to heavy pressure to form it into solid briquettes having the desired density, and the briquettes are pulverised to a granular powder of the desired degree of fineness.
H. ROYAL-DAWSON.

Preparing cyanogen chloride. R. V. HEUSER, Assr. to AMER. CYANAMID Co. (U.S.P. 1,588,731, 15.6.26. Appl., 25.11.24).—A solution of cyanide is passed downwards in counter-current to chlorine.
H. ROYAL-DAWSON.

Gas [hydrogen] manufacturing machine. C. F. ADAMS (U.S.P. 1,588,153, 8.6.26. Appl., 11.1.22).—The apparatus is especially suited to the manufacture of hydrogen. The solid reagent after being ground in a receiving chamber falls through a valve-controlled hopper into a cylindrical mixing chamber provided with a mechanical stirrer and a waste outlet at the bottom. The gas passes upwards into an outlet tube and flows through a condenser, cooled by air and water, into a gas holder.
R. B. CLARKE.

Method of producing hydrogen. C. C. VAN NUYS, Assr. to AIR REDUCTION Co. (U.S.P. 1,588,860, 15.6.26. Appl., 2.8.21).—A mass of ignited carbon is subjected to the action of steam and oxygen in a gas producer, and the resulting gas is separated into its constituents by liquefaction, the oxygen for the producer and the refrigerating agent for the liquefaction process being thereby produced at the same time.
H. ROYAL-DAWSON.

Production of oxygen-free nitrogen. F. J. METZGER, Assr. to AIR REDUCTION Co. (U.S.P. 1,588,258, 8.6.26. Appl., 15.1.26).—To a mixture of nitrogen and oxygen is added a proportion of combustible gas corresponding to the oxygen, and the mixture is led over a catalyst, preferably carborundum, in a special nickel-steel vessel. The catalyst is heated electrically to 400° and the gases are introduced at a pressure of 1000–2000 lb. per sq. in. The combustion products are liquefied at this pressure directly the gases pass away from the reaction zone, leaving a residue of pure nitrogen.
E. S. KREIS.

Production of pure table or the like salt from impure salt. N. V. MARECHU MAATS. TOT EXPLOIT. VAN CHEM. UITVINDINGEN, Assees. of M. KRUGER and S. R. UNKEL (E.P. 237,867, 18.4.25. Conv., 2.8.24).—See F.P. 593,279; B., 1926, 156.

Recovering lithium salts from phosphate minerals containing lithium. H. WEIDMANN, Assr. to ALLIED PROCESS CORP. (U.S.P. 1,591,196,

6.7.26. Appl., 24.11.24. Conv., 12.12.23).—See G.P. 413,722; B., 1925, 757.

Process of [mechanically] treating asbestos ore. S. H. DOLBEAR, and SELECTIVE TREATMENT Co., LTD. (E.P. 254,796, 8.4.25).

Ammonium sulphate (U.S.P. 1,589,809).—See II.

Calcining alkaline-earth carbonates (E.P. 253,305).—See X.

VIII.—GLASS; CERAMICS.

Dilatometric and thermal study of soda-silica glasses. M. O. SAMSOEN (Compt. rend., 1926, 183, 285—286).—Measurements carried out on soda-silica glasses by the method of Chevenard show a maximum coefficient of dilatation at 15° for a silica content of 56%. A maximum transformation temperature, between two minima, is observed corresponding to the composition $2\text{SiO}_2\cdot\text{Na}_2\text{O}$, which is analogous to alloys and salt mixtures forming eutectics. This and $\text{SiO}_2\cdot\text{Na}_2\text{O}$ are the only definite compounds existing in the silica-soda system in the vitreous state, the minima corresponding to a mixture of these two compounds, containing about 56% SiO_2 , and a mixture of silica and the compound $2\text{SiO}_2\cdot\text{Na}_2\text{O}$, containing about 73% SiO_2 . Glasses of composition falling on the branch of the curve extending from $\text{SiO}_2\cdot\text{Na}_2\text{O}$ to the first minimum are very easily devitrified.

J. GRANT.

PATENTS.

Preparing material for ceramic articles. A. O. AUSTIN, Assr. to OHIO BRASS Co. (U.S.P. 1,589,617, 22.6.26. Appl., 1.3.23).—The ingredients are powdered and lawned dry, after which sufficient water is added to produce a mix suitable for forming. This is placed under reduced pressure until the water has permeated the mass.

C. IRWIN.

Annealing glass. V. F. FEENY. From ILLINOIS PACIFIC GLASS Co. (E.P. 254,580, 30.10.25).—See U.S.P. 1,585,542; B., 1926, 585.

Manufacture of plastic material out of non-plastic oxides. O. RUFF (U.S.P. 1,591,563, 6.7.26. Appl., 18.11.22. Conv., 24.11.21).—See G.P. 382,556; B., 1924, 96.

IX.—BUILDING MATERIALS.

Thermal behaviour of puzzuolana and its reaction in the solid state with some alkaline-earth oxides and carbonates. G. MALQUORI (Gazzetta, 1926, 56, 42—51; cf. A., 1923, ii, 758).—In the heating of puzzuolana two critical points are observed at about 550° and 900—1060° respectively. As in the case of kaolin chemical changes occur at these points. Puzzuolana reacts with barium oxide at the same temperature as does alumina and kaolin and in the same way; it lowers the temperature of dissociation of barium carbonate to the same extent as alumina and kaolin. The behaviour of the

alumina in puzzuolana towards solutions of hydrochloric acid and calcium hydroxide shows the same characteristics as that of free alumina and the alumina of kaolin when these substances have all been heated to the same temperature. The author suggests that the results indicate the existence of free silica and alumina as the principal constituents of puzzuolana, as a silicate of aluminium would scarcely behave in this way. This would explain the setting of puzzuolana, and in view of the differences in the behaviour of silica and alumina according to their origin and treatment, it would also explain the variation in the mortars formed by treatment with lime.

S. B. TALLANTYRE.

Determination of uncombined lime in Portland cement. W. LERCH and R. H. BOGUE (Ind. Eng. Chem., 1926, 18, 739—743).—Portland cement contains compounds which are readily decomposed by water or weak acids so that any method involving the use of aqueous solutions is unreliable. The following modification of Emley's method is therefore recommended: 1 g. of finely ground cement is heated to boiling with 25—30 c.c. of absolute alcohol and 5—6 c.c. of anhydrous glycerol, and the mixture is titrated with a 0.2N solution of ammonium acetate in absolute alcohol using phenolphthalein as indicator. Boiling and titrating are continued until the pink colour does not reappear on boiling for several minutes. The solution is standardised against 0.1 g. of pure lime made by heating calcite to 900° in a platinum crucible. Alkalis and magnesia present in cement do not affect the results.

A. R. POWELL.

Destruction of cement drain-pipes in soil. K. NEHRING (Z. angew. Chem., 1926, 39, 883—887).—Experiments are described which indicate that when cement hardens in air carbon dioxide first combines with the calcium hydroxide after which the calcium aluminate and then the silicate are decomposed; the silica thus liberated is converted into the insoluble form. When the calcium carbonate in the cement exceeds 75% the pipes are much more easily damaged. From a detailed examination of two specimens of corroded drain-pipe and the soil from which they were removed (sandy loam) it is concluded that the free carbon dioxide in the groundwater is responsible for the destruction. The calcium compounds in the cement are first converted into carbonate and then dissolved out in the form of bicarbonate. Magnesium compounds, also, may sometimes take part.

S. K. TWEEDY.

PATENTS.

Process of treating slurry. R. C. NEWHOUSE, Assr. to ALLIS-CHALMERS MANUF. Co. (U.S.P. 1,589,712, 22.6.26. Appl., 30.1.25).—Slurry-forming material is finely ground in presence of water, and the heated slurry so formed is cooled sufficiently rapidly to prevent the absorption of enough water to cause setting.

A. COUSEN.

Impregnated woods and processes of treating woods. J. R. COOLIDGE (E.P. 254,795, 8.4.25).—See U.S.P. 1,556,570; B., 1925, 960.

X.—METALS; METALLURGY, INCLUDING ELECTRO-METALLURGY.

Formation of hair copper in copper mattes. System copper-iron-sulphur. H. TIEDEMANN (*Metall u. Erz*, 1926, 23, 200—210; *Chem. Zentr.*, 1926, I., 3624—3625).—The constitution of the system copper sulphide-ferrous sulphide-sulphur has been examined by microscopical, thermal, and conductivity methods. The composition of all technical copper matters lies on a line joining Cu_2S with Fe_2S_3 . Mixtures of cuprous and ferrous sulphides during cooling from 584° to 180° slowly decompose with the precipitation of hair copper and the formation of bornite ($3\text{CuS}_2, \text{Fe}_2\text{S}_3$). The deposition of copper is at a maximum in fused mixtures containing 62% Cu. These facts probably explain the occurrence of native hair copper in deposits of bornite and copper pyrites. A. R. POWELL.

Sand-cast alloys of aluminium containing cobalt. S. DANIELS (*Ind. Eng. Chem.*, 1926, 18, 686—691).—Addition of more than 0.5% Co to aluminium or to any of the common aluminium alloys increases considerably the shrinkage on solidification and decreases the tensile strength and ductility. The structure becomes more coarsely crystalline and the castings fuller of blow-holes as the cobalt content and, therefore, the casting temperatures are increased. The eutectic of aluminium and Al_3Co_3 contains about 6% Co and melts at 644° ; it usually appears as spherulitic or acicular bluish-grey aggregates in the micro-section and its character remains unchanged even after prolonged annealing. Cobalt-aluminium alloys are superior to copper-aluminium alloys in the salt-spray corrosion test. A. R. POWELL.

Analysis of commercial magnesium. BONNARD and DANDURAND (*Ann. Chim. analyt.*, 1926, 8, 197—198).—A claim for priority. The method described by Guérin (B., 1926, 326) was published by the authors in *Revue d'Artillerie*, 1925, 507. A. R. POWELL.

Deformation of tungsten single crystals. F. S. GOUCHER (*Phil. Mag.*, 1926, [vii.], 2, 289—309; cf. B., 1924, 792; *Phil. Mag.*, 1924, 48, 800).—The deformation under constant load of individual crystals in pure tungsten wires annealed at 3100°K . has been determined at 2000° and 1000°K . Similar measurements have been made on Pintsch single-crystal wires at lower temperatures. The time-extension curves for tungsten crystals show an initial rapid decrease in rate of flow, corresponding to a rapid increase in internal hardening, followed by a longer period at constant rate, over which hardening is proportional to the increase of stress. The hardening is removed by annealing at 2500°K . for 2 min. An X-ray study of the crystals reveals distortions of a crystallographic nature which are roughly proportional in amount to the deformation, and are not altered on annealing. The crystals deformed at 1000° show no difference in resolving power in the hardened state and after annealing,

whereas the Pintsch wires deformed at the ordinary temperature show an impaired resolving power which improves on annealing. The experiments support the view that hardening is due to residual elastic strains produced by the deformation process rather than to crystal breakdown.

A. B. MANNING.

See also A., Aug., 783, **Changes in crystal orientation of copper during recrystallisation** (TAMMANN and MEYER). 786, **Densities of molten lead-cadmium, cadmium-tin, and zinc-tin alloys and of molten cadmium** (SAUERWALD); **Heats of mixing of molten metals** (MAGNUS and MANNHEIMER); **Metallographic observations on cuprous oxide in copper** (SIEBE); **Miscibility of copper and of tin with iron in the molten state** (RUER and KUSCHMANN); **Supersaturated mixed crystals and nature of martensite** (RUER). 799, **Ternary system iron-chromium-carbon** (VON VEGESACK). 805, **Rapid corrosion of metals by acids within capillaries** (EVANS).

PATENTS.

Utilising low-grade iron ore. H. H. HINDSHAW, ASSR. to HINDSHAW ENGINEERING & DEVELOPMENT Co. (U.S.P. 1,588,420, 15.6.26. Appl., 12.12.24).—The crushed ore is converted into magnetic oxide by heating at 300 — 600° with a solid carbonaceous material in a limited supply of air.

L. M. CLARK.

Process and apparatus for melting iron. Y. A. DYER (U.S.P. 1,589,589, 22.6.26. Appl., 4.2.25).—A deep bed of carbonaceous material is ignited in presence of a supply of air and of the metal to be melted. In a second combustion chamber, the hot waste gases are passed under and through a thin layer of carbonaceous material in presence of additional metal for fusing.

L. M. CLARK.

Metal compositions. BRIT. THOMSON-HOUSTON Co., LTD., Assees. of N. H. ADAMS (E.P. 245,437, 19.12.25. Conv., 31.12.24).—See U.S.P. 1,552,184; B., 1925, 855. A material suitable for resistance welding electrodes and for bearings is prepared by compressing comminuted tungsten into the desired form, heating at 1250 — 1350° , and introducing into contact with the sintered mass, in an atmosphere of hydrogen, copper heated above its melting point.

Roasting or calcining ores consisting substantially of alkaline-earth carbonates or of iron carbonate. A. APOLD and H. FLEISSNER (E.P. 253,305, 18.12.24).—Ferrous carbonate or alkaline-earth carbonates are calcined in a shaft furnace by means of a current of hot air, with or without steam, the rate of passage of the hot gases being so regulated that the carbon dioxide evolved is rapidly removed from the furnace. In this way a lower temperature can be used, the time required is shortened, and a considerable economy of fuel is effected. A. R. POWELL.

Concentration of ores. S. TUCKER and MINERALS SEPARATION, LTD. (E.P. 253,587, 16.3.25).—Complex ores, the constituents of which fall into four specified groups including (i) galena, compound sulphides of lead with antimony, bismuth, and silver, and copper sulphides such as chalcopyrite, (ii) zinc blende, (iii) iron pyrites, and (iv) tin-containing material such as cassiterite and franckeite, are successively separated in this order by froth-flotation. The ore is washed for removal of soluble constituents. Removal of the first group is effected in a neutral or alkaline pulp by use of a limited quantity of frothing agent. Alkalinity is attained by addition of caustic soda. Addition of copper sulphate to the alkaline pulp, followed by that of a frothing agent such as coal-tar oil or blast-furnace creosote suffices for removal of the second group. The third group is removed by slight acidification of the circuit-liquor and repeated froth-flotation. Gangue is then removed from the cassiterite by gravity-concentration.

L. M. CLARK.

[Ductile] alloy. T. H. REIGHARD (U.S.P. 1,588,468, 15.6.26. Appl., 24.10.22).—A flux manufactured from furnace slag is added to molten copper. The requisite proportion of aluminium is added and an arc heater introduced into the molten mass. After considerably raising the temperature in this way the alloy is allowed to cool. S. PEXTON.

Alloy of tantalum. P. H. BRACE, Assr. to WESTINGHOUSE ELECTRIC AND MANUF. CO. (U.S.P. 1,588,518, 15.6.26. Appl., 18.4.19).—An alloy resistant to acids and oxidation contains 5 to 30% of chromium, the remainder being tantalum and nickel in the proportions of 1 to 75% of nickel and 25 to 99% of tantalum.

L. M. CLARK.

Metallurgical process. R. D. PIKE and G. H. WEST (U.S.P. 1,588,806, 15.6.26. Appl., 8.7.24).—Ores, e.g., copper concentrates, are digested with ferric chloride solution to dissolve all the soluble metals and the solution is treated with ferrous sulphide sufficient to reduce the ferric salt to ferrous and to precipitate certain metals at temperatures above 100°.

A. R. POWELL.

Method of ore treatment. J. T. TERRY, JUN., Assr. to METALS RECOVERY CO. (U.S.P. 1,589,615, 22.6.26. Appl., 19.10.14).—Certain metals are dissolved from an oxidised ore by a suitable solvent and reprecipitated in the pulp in elementary form. The pulp is then concentrated by settling.

C. IRWIN.

Chromium plating. K. W. SCHWARTZ, Assr. to CHROMIUM PRODUCTS CORP. (U.S.P. 1,589,988, 22.6.26. Appl., 11.11.24).—Metallic chromium anodes are used in acid plating baths containing chromic acid as the predominating acid.

A. R. POWELL.

Coating iron and iron alloys with chromium. S. KYROPOULOS (U.S.P. 1,590,101, 22.6.26. Appl., 23.3.25. Conv., 26.7.23).—A superficial zone of iron containing a small percentage of carbon is prepared on the article, which is then coated with chromium and tempered.

L. M. CLARK.

Plating with chromium. J. M. HOSDOWICH, Assr. to CHROMIUM PRODUCTS CORP. (U.S.P. 1,590,170, 22.6.26. Appl., 10.9.25).—To improve the throwing power of chromium baths containing the metal in two different states of oxidation, a small quantity of a soluble salt of a metal more electronegative than chromium is added to the bath.

A. R. POWELL.

Preventing the adherence of zinc oxide crusts to the walls of the condenser. URBASCH & Co. (G.P. 427,827, 5.12.24).—The interior surface of zinc condensers is coated with a mixture of a basic self-binding material (cement) and a non-binding material containing alkaline-earth oxides or magnesia with or without the addition of a rich loam. The mixture must contain a certain definite proportion of lime or it is useless.

A. R. POWELL.

Purification of copper. GES. FÜR HÜTTEN-MÄNNISCHE VERFAHREN M.B.H. (G.P. 427,915, 24.5.24).—Copper cathodes, scrap or alloys, or black copper are melted in an oxidising atmosphere to remove impurities and subsequently deoxidised by the addition of zinc and lead sufficient to combine with the oxygen content of the copper. Finally the metal is melted *in vacuo* to remove excess of zinc. If desired the zinc may be added in the form of brass.

A. R. POWELL.

Purification of mercury by distillation. SIEMENS & HALSKE A.-G. (G.P. 428,023, 2.8.24).—Mercury is heated under pressure in a chamber separated from a second chamber under reduced pressure by a porous partition which is permeable only to mercury vapour.

A. R. POWELL.

Manufacture of pig iron. C. DAVIES, JUN. (E.P. 254,442, 27.4.25).—See U.S.P. 1,535,109; B., 1925, 596.

Reduction of alumina. METAL RESEARCH CORP. (E.P. 245,421, 13.11.25. Conv., 30.12.24).—See U.S.P. 1,551,615; B., 1925, 854.

Desulphuration of zinc ores. W. J. MELLERSH-JACKSON. From SOC. ANON. DES MINES ET FONDERIES DE ZINC DE LA VIEILLE-MONTAGNE (E.P. 254,389, 1.4.25).—See G.P. 401,599; B., 1925, 14.

Reduction of ores with continuous regeneration and transformation of the residual gas produced during reduction into fresh reducing gas. G. CONSTANT and A. BRUZAC (U.S.P. 1,591,470, 6.7.26. Appl., 7.8.23. Conv., 22.8.22).—See E.P. 202,970; B., 1925, 13.

Producing magnesium-silicon alloy. I.-G. FARBENIND. A.-G., Assees. of W. SCHMIDT (U.S.P. 1,592,160, 13.7.26. Appl., 15.11.23. Conv., 17.11.22).—See G.P. 397,346; B., 1924, 876.

Apparatus [tuyère] for the introduction into furnaces and blast furnaces of materials or residues. G. DE BETHUNE (E.P. 254,396, 3.4.25).

Apparatus for testing the hardness of materials [metals]. T. HOUGH, and J. TICKLE & Co., LTD. (E.P. 254,465, 14.5.25).

Reclaiming spent pickling solutions (U.S.P. 1,589,610).—See VII.

XI.—ELECTROTECHNICS.

Electrolysis of sodium chromate with a mercury cathode. I. STSCHERBAKOV and O. ESSIN (Z. Elektrochem., 1926, 32, 396—399; cf. B., 1925, 710).—In the electrolytic production of dichromate from chromate a sudden rise in the conductivity of the electrolyte is observed when the composition corresponds to the polychromate, $\text{Na}_2\text{Cr}_4\text{O}_{12}$. In order to obtain the best yields of dichromate, electrolysis may be conducted either in normal chromate solutions at high current density or at lower current density in solutions of the above polychromate composition. W. A. CASPARI.

See also A., Aug., 801, Electrolysis of molten sodium-mercury alloys (KREMANN, KRIEGHAMMER, and GRUBER-REHENBURG); Electrolysis of molten bismuth-tin alloys (KREMANN, KRIEGHAMMER, and TRÖSTER); Electrolysis of molten tin-cadmium alloys (KREMANN and BAUKOVAC). 802, Electrolysis of molten alloys of aluminium with magnesium, antimony, zinc, and silver (KREMANN and DELLACHER); Electrolysis of molten metal sulphides and phosphides (KREMANN and BAUKOVAC); Electrolysis of molten alloys of silver with tin, antimony, bismuth, and lead (KREMANN and BAYER). 804, Cathodic deposition of metals (FRÖHLICH, CLARK, and ABORN).

PATENTS.

Transformer and switch oils. I.-G. FARBENIND. A.-G., Assees. of C. THODE and A. BENISCHEK (G.P. 427,744, 12.4.25).—The use of liquid triaryl phosphates is claimed. L. A. COLES.

[Electric induction] apparatus for the treatment of gases at high temperatures. M. FOURMENT (E.P. 244,749, 7.12.25. Conv., 22.12.24).—See F.P. 593,298; B., 1926, 145.

Leading-in means, particularly for high-tension currents [in electrical gas purifying apparatus]. LODGE-COTTRELL, LTD. From METALLBANK & METALLURGISCHE GES. (E.P. 254,605, 29.12.25).

Apparatus for refining oil (U.S.P. 1,586,132)—See II.

Treating hydrocarbons and oils (U.S.P. 1,588,308).—See II.

Plating with chromium (U.S.P. 1,589,988 and 1,590,170).—See X.

Preservation of sap-containing feeding-stuffs (Swiss P. 106,942).—See XIX.

XII.—FATS; OILS; WAXES.

Determination of the titer of tallow. J. DAVIDSOHN (Z. Deuts. Oel- u. Fett-Ind., 1926, 46, 353—354).—The effect of varying the conditions in

the Dalican method of determining the titer (solidif. point of insoluble fatty acids) of tallow was determined. A particular tallow gave the following results: (a) without stirring, titer 43.50° and 43.40°; (b) stirring three times to the right and three times to the left after solidification started, 43.48° and 43.40°; (c) stirring from the start until solidification commenced, 44.20°. It is recommended to omit the use of alcoholic potash for the saponification, which can be effected by heating the fat and aqueous alkali on a water bath, and then keeping the mixture at 100—105° for 1½ hrs. This is much safer than the alcoholic alkali saponification, as there is no risk of ester formation from traces of alcohol left in the mixture. In the case of the above tallow, when the alcohol was not completely removed after saponification with alcoholic alkali a titer of (a) 39.90°; (b) 40.82°, and (c) 40.75° under the conditions mentioned was observed. It is stated that the latent heat of fusion of the fatty acids decreases with repeated reheating and finally neither rise nor stationary point is observed in the test; in such cases a fresh sample must be taken. A. RAYNER.

New fatty acids in shark liver oil. Fatty acids of shark and ray liver oils. I. M. TSUJIMOTO (Z. Deuts. Oel- u. Fett-Ind., 1926, 46, 385—388).—The fatty acids from two species of red shark were examined, and two new fatty acids were isolated, viz., *selachoceric acid*, $\text{C}_{21}\text{H}_{48}\text{O}_2$, white crystals, m.p. 78°, and *selacholeic acid*, $\text{C}_{24}\text{H}_{48}\text{O}_2$, white crystals, m.p. 42.5—43°. The latter when hydrogenated gave a saturated acid, *isoselachoceric acid*, m.p. about 82°. By treating selacholeic acid with nitrous acid, a stereoisomeride, *selachelaidic acid*, m.p. 60.5°, was produced. A. RAYNER.

Test for Chinese wood [tung] oil. E. R. BOLTON and K. A. WILLIAMS (Analyst, 1926, 51, 335—338).—Adulteration of tung oil by small proportions (5%) of other oils may be detected and information as to the nature of the adulterant obtained by applying a modification of Worstall's test. 150 g. of oil are heated in an aluminium beaker of 3 in. diameter, and approximately 4 in. high, so as to reach 285° in 4 min., the mixture being vigorously stirred by the thermometer. At 285° a stopwatch is started and the time noted to the point where the oil fails to drop, the temperature meanwhile being kept constant. Genuine oils reach this point in less than 8 min. 2 g. are then cut from the centre of the resulting polymerised mass, incorporated with about 3 g. of silver sand and 2 c.c. of light petroleum, and extracted with light petroleum. Pure tung oils give an extract of 28% with a variation not exceeding 2% on either side. The percentage of foreign oil is found by deducting 30.0 from the extract per cent., and multiplying by 2.70 if the adulterant is linseed oil or other oil of similar high iodine value, and by 1.33 for other oils. D. G. HEWER.

Polymerisation of linseed and sunflower oils in the form of their soaps. G. S. PETROV and S. J. DIMAKOV (Z. Deuts. Oel- u. Fett-Ind., 1926,

46, 417—418).—In the oxidation or polymerisation of glycerides, it is known that loss of glycerol occurs, acraldehyde being almost invariably formed. This fact was quantitatively confirmed by the authors, who oxidised two samples of linseed oil at 180° for 20 and 50 hrs. respectively, the sp. gr. rising to 0.950 and 0.989 while the glycerol content fell from the theoretical 10.5% to 8.76% and 5.95%. The desirability of polymerising the soaps of drying and semi-drying oils rather than the original glycerides was therefore suggested. Fatty acids were isolated from soaps of linseed and sunflower oils that had been heated under pressure for 5 hrs. at 160—200°, alone and in the presence of various amounts of alkalis. The presence of free alkali during the treatment caused a marked increase in the viscosity and decrease in the iodine value of the acids, while in the absence of much free alkali, the polymerisation proceeded best when the soap was introduced directly into the autoclave (no special containing vessel being used).
S. S. WOOLF.

Inhibiting agents in the oxidation of unsaturated organic compounds. O. M. SMITH and R. E. WOOD (Ind. Eng. Chem., 1926, 18, 691—694).—By measurement of the volume of oxygen absorbed the authors have examined the effect of numerous substances on the atmospheric oxidation of oils and fats, fatty acids, soaps, and rubber. Active inhibitors may be divided into two main groups, powerful reducing agents such as stannous compounds, sodium thiosulphate, etc., and strong bases, particularly amines. The action of sodium hydroxide, carbonate, silicate, and phosphate is possibly due to their combination with substances produced by oxidation which themselves act as catalysts. Aromatic alcohols and phenols are also effective as inhibitors. The inhibiting substance will prevent oxidation at any period during the oxidation and in general stability and resistance towards oxidation increase with the concentration of the inhibitor. In some cases, *e.g.*, phenols, such as eugenol, there is a concentration at which the inhibitor is most effective and above which it acts as a positive oxygen catalyst. The influence of the inhibitor is only temporary, the period depending on the temperature, concentration, and products of oxidation. After the effect of the anti-oxidant is lost the rate of oxidation is the same as before. It is suggested that the basic inhibitors combine with acidic oxidation products and prevent them acting as autocatalysts in the oxidation, or that the partial valencies of the trivalent nitrogen atom (or other elements with free valencies) form intermediate compounds with the easily oxidised ethylenic carbon atoms. This temporary compound controls the rate of oxidation for a definite but limited period of time.
R. BRIGHTMAN.

Myricyl alcohol [from carnauba wax]. S. GOTTFRIED and F. ULZER (Chem. Umschau, 1926, 33, 141—145).—Myricyl alcohol was isolated from carnauba wax as follows. The wax was purified by the removal of 3—5% of impurities by extraction with alcohol in a Soxhlet apparatus. It was then

saponified with alcoholic potash for 48 hrs., the alcohol was removed by evaporation, the soap and free alcohols were dissolved in hot water, and the excess alkali was removed by successive solution and precipitation of the soaps with salt. From this product the unsaponifiable matter was extracted by means of trichloroethylene, which is a better solvent than light petroleum. The unsaponifiable matter was next acetylated by acetic anhydride, and the neutral esters were separated by a series of fractional distillations. The following fractions were separated at 10 mm. pressure: (a) b.p. 268—270°, m.p. 58.5—59°, identified after recrystallisation as *n*-heptacosane; (b) b.p. 296—298°, m.p. 62—62.5°; yielded by fractional precipitation from acetone and chloroform solution and subsequent saponification ceryl alcohol; (c) b.p. 312—314°, by one crystallisation from a mixture of one part of trichloroethylene and 5 parts of alcohol gave an acetate, which on saponification yielded an alcohol shown to be myricyl alcohol and amounting to 45% of the raw carnauba wax. The myricyl alcohol had the composition C₃₀H₆₂O, not C₃₁H₆₄O as stated by Gascard (B., 1924, 140).
A. RAYNER.

Determination of clouding point of soap solutions. K. BRAUN (Z. Deuts. Oel- u. Fett-Ind., 1926, 46, 370; cf. B., 1926, 135).—The advantages of making the determination on a solution having a definite concentration of fatty acids rather than of soap are emphasised, but a 1% solution could be used equally as well as the 3% solution previously suggested.
A. RAYNER.

PATENTS.

Separating oil from solid vegetable substances. K. HOLTER and S. THUNE (E.P. 246,527, 15.4.25. Conv., 13.9.24. Addn. to 232,601; B., 1926, 448).—The process for treating blubber etc. described in the chief patent may be applied in the treatment of oil-bearing vegetable substances.
A. RAYNER.

Apparatus for distilling fatty acids. H. BOLLMANN (E.P. 246,803, 18.11.25. Conv., 2.2.25).—Distillation is effected under vacuum in a column still, preferably constructed of firebrick and surrounded by a metal jacket. The fatty acids enter at the top of the still and pass downwards over a retarding filling, *e.g.*, Raschig rings, supported on a series of partitions fixed to the side of the still, the partitions having central openings to facilitate the passage of the fatty acids and of the steam, which enters at the bottom of the still.
A. RAYNER.

Purification of oils and fats. A. S. KONSTAS, and Soc. ANON. IND. DES MATIÈRES GRASSES ET SAVONS "VELOS" (E.P. 252,949, 8.9.25).—To recover oil carried down in the soap stock in the alkali refining of oils, the mixture is extracted with a solvent for the soap which does not appreciably dissolve the oil, and is also miscible with water. After separation of the undissolved oil, the solvent, *e.g.*, methylated spirit, is recovered from the soap
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solution by circulating the latter in contact with a boiling solution of common salt, contained in a vessel divided by a partition into two compartments, communicating with one another through apertures in the lower part of the partition. The soap solution is heated, so that ebullition takes place only in one compartment, the precipitated soap being carried to the surface of the liquid in the other compartment free from the volatile solvent, which is distilled over with the steam and recovered. A. RAYNER.

Refining oils and fats. F. C. GEPHART, Assr. to COCOA PRODUCTS Co. OF AMERICA (U.S.P. 1,588,405, 15.6.26. Appl., 11.5.23).—Oils and fats are refined by heating with willow charcoal and infusorial earth. A. RAYNER.

Refining. [Deodorising oils.] H. M. LAMY-TORRILHON (U.S.P. 1,592,112, 13.7.26. Appl., 10.4.24. Conv., 14.4.23).—See E.P. 214,273; B., 1926, 99.

Lubricating oil (U.S.P. 1,587,859).—See II.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Glycol ethers and their use in the lacquer industry. J. G. DAVIDSON (Ind. Eng. Chem., 1926, 18, 669—675).—The solubility of cellulose nitrate in alcohol-ether mixtures suggested the probable utility of alkyl ethers of the alkylene glycols as "two-type" solvents for cellulose lacquers. A large number of glycol and polyglycol ethers showed excellent solvent properties and pronounced superiority over the ester type of cellulose ester solvent, the monoethyl ether of ethylene glycol being particularly suitable. It has b.p. 134.8°/743 mm., d_{15}^{15} 0.9360, n_D^{24} 1.4042; it mixes in all proportions with most organic solvents, and forms with water a mixture of constant b.p. (98—99°), containing 40% of the ether by volume. Its dilution ratio (proportion of non-solvent that causes precipitation of cellulose nitrate from a 10% solution in the solvent) is unusual, ranking higher than that of ethyl lactate and much higher than that of butyl acetate for the three diluents toluene, light petroleum, and water. Its powerful, but slow, solvent effect permits of the retention of considerably more than the usual amounts of cellulose nitrate, and therefore pigment, in a lacquer of consistency suitable for brushing, while the need for plasticisers is obviated or lessened. Lacquers made with this solvent thus dry harder and more resistant to abrasion than the normal, whilst they have greater hiding power and may be brushed out without affecting the previous coats. They are free from residual odour and do not deteriorate on storage by the development of acidity, hydrolysable ester groups being absent from the solvent. Though this ether is not a universal resin solvent, the difficultly soluble gum dammar and ester gum may, with some preliminary treatment, be rendered compatible with cellulose nitrate in this solvent. S. S. WOOLF.

Deposits in varnishes. F. WILBORN (Farben-Ztg., 1926, 31, 2351).—To investigate the causes of

clouding in varnishes, widely attributed to the progressive formation of insoluble lead salts of hydroxy-acids, the author prepared varnishes by incorporating a fixed weight of lead-manganese resinate, in the absence of air, with samples of raw linseed oil and the same oil air-blown for 6, 12, and 24 hrs. respectively at 120°. The iodine values of the four oils were 176.6, 172.5, 168.2, and 163.0, and the relative viscosities 100, 112, 133, and 164 respectively. The drying times of the corresponding varnishes were 8 hrs. 25 min., 8 hrs. 5 min., 7 hrs. 30 min., and 6 hrs. 5 min. The varnishes (which approximated to each other in colour, although the blown oils were appreciably bleached) were observed in glass tubes over a period of 6 months. Contrary to anticipation, there was no heavier sediment in the varnishes made from blown oil than in that from raw oil. S. S. WOOLF.

Joint use of cobalt-lead driers. F. WILBORN (Farben-Ztg., 1926, 31, 2352—2353).—The lack of mechanical strength in films in which cobalt is the sole drier may be compensated by the use of lead drier in conjunction with the cobalt, the extreme rapidity of drying induced by the latter still being evident. The author has observed the drying times of varnishes containing various proportions of these metals added as resinates (containing 6.5% of cobalt and 23.1% of lead respectively). Three composition-drying time curves, corresponding to total resinate contents of 3%, 2%, and 1.5% respectively, are given, the drying time in each case rising slowly from the cobalt resinate alone to the 1:1 mixture, further increase in the proportion of lead resinate causing a more rapid rise in drying time. A total of 2% of cobalt-lead resinate is recommended, distributed according to the drying time and strength of film required. S. S. WOOLF.

Reactions between solid substances reduced to the colloidal state. STERKERS and BREDEAU.—See A., Aug., 792.

Polymerisation of linseed and sunflower oils. PETROV and DIMAKOV.—See XII.

PATENTS.

Apparatus for extracting rosin and turpentine from wood. MCG. CLINE (U.S.P. 1,589,837, 22.6.26. Appl., 25.8.22).—Finely divided wood is progressively forced down through a retort and discharged, being in contact with a counter-current of steam throughout. S. S. WOOLF.

Manufacture of artificial resins. A. REGAL (E.P. 254,888, 29.7.25).—See U.S.P. 1,584,472; B., 1926, 596.

Nitration of petroleum distillates (U.S.P. 1,588,027).—See XX.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Needle form of the caoutchouc molecule as a practical structure theory. E. LINDMAYER (Gummi-Ztg., 1926, 40, 2261—2262).—The hypo-

thesis is put forward that the rubber molecule consists of a chain of which the length is expressed by x in the formula $(C_5H_8)_x$, and is of the order of 14 times the diameter. The properties of raw rubber and the changes induced by physical manipulation and by vulcanisation are considered from this point of view. S. I. LEVY.

Thermodynamics of the Joule effect in raw rubber. L. HOCK and S. BOSTROEM (Kautschuk, 1926, 130—136; cf. B., 1925, 816).—The hysteresis diagrams for a sample of raw smoked sheet rubber on first and second extensions have been constructed from data obtained with a specially modified Schopper machine, and the values compared with those obtained for the same sample after vulcanisation. The hysteresis loops for both raw and vulcanised material for a first elongation of 600% enclose approximately the same areas, but the work done in extension is about four times as great with the latter; the relatively much smaller hysteresis loss for the vulcanised material corresponds with the much smaller permanent extension, and the similarity of the first and second extension curves with this material. The second extension curve for the raw rubber is considered to correspond more closely with the true internal structure of the rubber than the first, which depends on the more or less accidental structure of the coagulum. S. I. LEVY.

Agglomeration density of rubber in relation to aggregation, vulcanisation, deformation, and temperature. M. KRÖGER (Gummi-Ztg., 1926, 40, 2319—2321).—Aggregation, vulcanisation, deformation, and reduction of temperature lead to increase in the density of raw rubber. X-Ray examination of test pieces after keeping for five years showed two diffuse rings. No effect on ultra-violet light could be observed with a rubber-sulphur chloride gel. S. I. LEVY.

Heat reactions occurring during vulcanisation of rubber. A. A. PERKS (J.S.C.I., 1926, 45, 142—149T).—Combination of rubber and sulphur is slightly exothermic in the early stages, but after 4—5 pts. of sulphur have combined with 100 pts. of rubber a strongly exothermic reaction sets in, and the temperature may rise 100—150° above the vulcanising temperature, with evolution of hydrogen sulphide. With pale crêpe the maximum effect was observed with a mixing of 79 pts. of rubber and 21 pts. of sulphur. The removal of the resin delays the start of the reaction, but the presence of accelerators hastens it and appears to cause greater evolution of heat. The necessity for long cures at low temperatures for ebonite mixings is thus made clear. Mixings containing over 10% of sulphur show an arrest in the temperature-time curve at 100°, due mainly to changes occurring in the sulphur. S. I. LEVY.

Prevention of lead poisoning in industry.
I. Rubber industry. C. A. KLEIN (J. Ind. Hyg., 1926, 8, 296—299).—The method adopted, by which the manufacturer supplies to the rubber goods factories a mixture of 80 pts. of the lead compound

with 20 pts. of rubber or wax in the form of thin sheets which do not give rise to dust, has proved very successful in preventing poisoning in the latter factories. S. I. LEVY.

Inhibiting agents in oxidation of unsaturated organic compounds. SMITH and WOOD.—See XII.

PATENTS.

Caoutchouc compositions. A. BIDDLE (E.P. 253,740, 31.7.25).—Waterproof adhesive and glue-like compositions are prepared by incorporating casein and a soluble silicate with rubber, gutta-percha, or balata latex. S. I. LEVY.

Treatment of rubber. F. C. JONES (U.S.P. 1,591,132, 6.7.26. Appl., 5.3.23. Conv., 11.3.22).—See E.P. 199,095; B., 1923, 789 A.

XV.—LEATHER; GLUE.

Alkaline hydrolysis of hide. E. AGENO-VALLA and G. BORNATE (Boll. Uff. Staz. Sperim. Ind. Pelli, 1926, 4, 83—89).—The fact that preliminary treatment with lime renders difficult the unhairing of hide even by concentrated sodium sulphide solution is not due to any specific action of the lime, such as insulation of the fibre by precipitated calcium sulphide. Similar protective action is, indeed, exerted by other alkaline hydroxides in low concentration. The experimental results obtained fail to support Merrill's suggestion (cf. B., 1925, 18, 327) that the hydrogen-ion concentration of the solution is the determining factor; preliminary treatment of the hide with acid appears to aid subsequent hydrolysis of the keratin by sodium sulphide. The presence of hydroxyl ions should diminish the dissociation of the keratin as a base and cause it to function solely as an acid, with formation of the corresponding salt, but this could scarcely result in a protective action. Possibly the hydroxyl ions cause an intramolecular transposition, such as that of the NH·CO group into NC·OH or that of the groups united to the benzene nucleus, and thus produce increased stability. T. H. POPE.

Determination of the proteolytic power of bating materials. L. CHIESA (Boll. Uff. Staz. Sperim. Ind. Pelli, 1926, 4, 112—122).—Determinations of the proteolytic powers of three bating materials by Lepetit's method (B., 1924, 481) and by the casein method give results of the same order in the two cases. As a rapid means of control, the following modification of the casein process is suggested. A casein solution is prepared by precipitating casein by a 1% acid solution in presence of a trace of organic calcium salts and dissolving the precipitate in water containing just enough 10% sodium hydroxide solution to turn the liquid pink on addition of phenolphthalein solution. A 5% aqueous solution of the bating material is prepared at 38—40°; the liquid is shaken occasionally and allowed to settle, the comparatively clear liquid being used. To 20 c.c. quantities of the casein solution in test-tubes are added 2 c.c. of 5% solutions of the different bating materials, the liquids being mixed and the

tubes kept at 38—40° for an hour and then placed in boiling water and left there for 1 min. after a precipitate appears. The value of the bating material is shown by the volume of the precipitate which subsequently settles, and by the clearness of the supernatant liquid. The results obtained may be checked by filtering off the precipitates and precipitating the residual undecomposed casein by addition of 5 c.c. of 10% acetic acid solution. This method gives results in agreement with Lepetit's method. The use of commercial casein may be avoided as follows: to 100 c.c. of fresh milk at 35° are added 10 c.c. of the 5% solution of the bating material; the mixture is vigorously stirred and then left at rest at 35° and the time measured from addition of the material until coagulation occurs; this is the case when a wisp of straw, immersed vertically in the liquid until it touches the bottom of the beaker, remains upright. The most active bating enzyme will cause coagulation in the shortest period of time.

T. H. POPE.

Combining power of various vegetable tanning substances with the protein of hide. C. SCHIAPARELLI and C. AVENATI-BASSI (Boll. Uff. Staz. Sperim. Ind. Pelli, 1926, 4, 134—146).—Previous investigations on the extent and manner of absorption of natural tanning agents during tanning, mostly carried out with hide powder, are briefly reviewed. The experiments now described show that, of the three materials, sulphited quebracho, sumac, and *tannin puriss.* (Kahlbaum), the last gives the greatest, and the first the least, yield; the swelling also is greatest with the pure tannin. Leathers obtained with extracts of oak, quebracho, sumac, chestnut, and myrobalans show diminishing temperature of gelatinisation (cf. B., 1924, 142; 1925, 463, 464) and resistance to hot water in the order given.

T. H. POPE.

[Tanning properties of] complex chromium salts. E. AGENO-VALLA and R. ASTENGO (Boll. Uff. Staz. Sperim. Ind. Pelli, 1926, 4, 69—74).—The results obtained in an examination of the behaviour of a number of complex chromium salts towards hides indicate that the tanning properties of the chromium are peculiar to the chromium ion, which loses these properties when its co-ordination valencies are saturated by various molecules. It seems, therefore, that the secondary valencies play an important part in tanning. An explanation is thus furnished of the difficulty of demonstrating that chrome leather is a true chromium compound and of the fact that part of the acid of the chromium salt remains as an essential constituent of the leather. Some of the salts examined are absorbed by the hide, but exert no tanning action, and others are not absorbed even sufficiently to colour the hide. Those salts having a complex univalent cation are absorbed far more readily than the others; the complex base $[\text{Cr}(\text{NH}_3)_5\text{H}_2\text{O}](\text{OH})_3$ is strongly absorbed, probably owing to its alkaline reaction. The hydroxy-salts are usually very slightly soluble and thus not easy to test, but they do not appear to have

tanning properties or to be absorbed by hides. If only the ordinary valency of the chromium and that of the anion in the molecule are considered, these salts are basic, the basicity of hydroxydiaquotriamminochromic iodide being 3:2 and that of dihydroxydiaquodiamminochromic bromide 3:1. Basicity alone is not a sufficient condition for these salts to exert tanning properties; in addition the chromium must be in the ionic state and must have free co-ordination positions.

T. H. POPE.

Determination of chromic oxide in chrome leather. L. CAREGGIO and G. BUSSINO (Boll. Uff. Staz. Sperim. Ind. Pelli, 1926, 4, 123—124).—If, in the ordinary method of determining chromium trioxide in chrome leather, the fusion of the leather with a mixture either of sodium carbonate and potassium nitrate or of sodium carbonate and potassium carbonate and chlorate is effected in a porcelain instead of a platinum crucible, treatment of the mass with hydrochloric acid gives silicic acid, which would interfere with the iodometric titration and must be removed. To this end the liquid is evaporated and the residue dried, both of these operations being carried out on a water-bath. The dry residue is then dissolved in water containing a small quantity of hydrochloric acid, the whole of the silicic acid being thus converted into polysilicic acids, which are insoluble in water or acid and are eliminated by filtration prior to treatment with potassium iodide and titration with iodine.

T. H. POPE.

See also A., Aug., 792, Concentration and purification of solutions of hydrophilic colloids (BECHHOLD and HEYMANN). 793, Swelling and osmotic pressure of gelatin in salt solutions (NORTHROP and KUNITZ).

PATENT.

Process for brightening dark tannages. FARBW. VORM. MESITER, LUCIUS, & BRÜNING, Assees. of K. DAIMLER (G.P. 423,137, 15.2.22).—The tannage is after-treated with insoluble, light-coloured, non-volatile organic compounds, especially hydroxyaryl compounds, which are less acidic than the tannin which has been used. For instance, leather tanned with the brown tannin prepared from lignite and nitric acid, after previous rinsing, is agitated for 10 min. in a 1—4% solution of β -naphthol in caustic soda or an aqueous solution of the sodium salt of the resin obtained from sulphur chloride and crude cresol. The bleaching liquor is then replaced by 0.25—1% hydrochloric acid and after 5 min. the leather is rinsed in water for 30 min. The colour of the leather is equal to that obtained with oak-tannin and is much brighter than the original. A dark quebracho tannage can be brightened in the same way. In place of the sodium salt of β -naphthol may be used the alkali salts of α -naphthol, chloronaphthols, hydroxyanthracene, cresol-formaldehyde or cresol-paraldehyde condensation products, or alkali-soluble natural resins or lignic acid.

R. BRIGHTMAN.

XVI.—AGRICULTURE.

Suction force of soils. Application to the study of the soil-plant system. J. H. JOFFE and H. C. McLEAN (Science, 1925, 62, 548—550).—Since the suction force of a soil is a measure of the colloid content (A., 1925, i., 1372), these data may be correlated with the wilting point of plants. The relation of the phenomenon to irrigation and moisture movement in soils is considered.

A. A. ELDRIDGE.

Separation of the slimy and colloidal components of the soil by centrifuging. J. DUMONT (Compt. rend., 1926, 183, 131—133).—The use of a centrifuge revolving at 10—150 revs. per sec. is to be preferred to sedimentation processes for the analysis of soils, and produces an increase in the rate of settling of the particles of 52—11,000 times according to their diameters. Samples of crude clay obtained in the physical analysis of soils, have been centrifuged at various speeds in an ammoniacal medium, and may be divided into slime consisting of particles of diameter less than 0.001 mm., and true colloidal clays which remain in suspension. The former vary from 60 to 95% of the total. The method may be made quantitative. J. GRANT.

Effects of lime and potash fertilisers on certain muck soils. F. LOEWING (Bot. Gaz., 1925, 80, 390—409).—The use of calcium carbonate as fertiliser depressed the potassium content and the potassium : calcium ratio in crops grown on acid muck soils. Application of lime and potash depressed the organic nitrogen and carbohydrate content. High nitrate-nitrogen is associated with high calcium content of tissues and low crop-yield; high crop-yield is associated with high organic nitrogen and high total carbohydrate content.

A. A. ELDRIDGE.

Disinfection of seeds. A. NIETHAMMER (Biochem. Z., 1926, 172, 173—211).—The disinfection of seeds with bleaching powder is discussed. The nature and strength of the infection, origin, and surface characteristics play an important part in the success or failure of disinfection; e.g., round smooth seeds are easiest to disinfect. Owing to these difficulties the seeds should be gathered under conditions as nearly aseptic as possible.

H. I. COOMBS.

PATENTS.

Manufacture of fertilisers. E. L. PEASE and D. TYREE (E.P. 253,572, 19.2.25).—Finely-ground rock phosphate is treated with sulphuric acid and the mixture is filtered and washed until strong phosphoric acid ceases to be obtained. The calcium sulphate, which still contains phosphoric acid and generally some calcium phosphate, is treated with ammonia and carbon dioxide (or with a solution of ammonium carbonate) until carbon dioxide is no longer absorbed. Calcium carbonate containing phosphate, and ammonium sulphate are thus formed; the former is filtered off, washed, and dried and the latter is recovered by crystallisation from the

washings. One quantity of sulphuric acid, used in this manner, thus serves to fix much more than its equivalent of ammonia. C. T. GIMINGHAM.

Manufacture of fertilisers. E. L. PEASE (E.P. 253,580, 16.3 and 7.7.25).—A fertiliser is prepared by mixing ground mineral or organic calcium phosphate with a porous material, such as ground peat, and treating the mixture either with sulphuric acid and water, or, after moistening, with gases containing sulphur dioxide and air or oxygen, or with gases containing sulphur trioxide, and, finally, using the calcium sulphate and phosphoric acid so produced as an absorbent for ammonia.

C. T. GIMINGHAM.

Process of treating phosphate material. H. BLUMENBERG, JUN., ASSR. to STOCKHOLDERS' SYND. (U.S.P. 1,588,651, 15.6.26. Appl., 7.8.25).—Ground phosphate rock is mixed with sodium nitrate, ammonium sulphate, and water, and the mixture is treated with sulphur dioxide. Sodium sulphate, ammonium phosphate, ammonium sulphite, and calcium nitrate are thereby formed.

C. T. GIMINGHAM.

Insecticide. E. H. SIEGLER and C. H. POPENOE (U.S.P. 1,589,866, 22.6.26. Appl., 17.11.24).—Lauric acid, or any free aliphatic acid having more than four carbon atoms in the radical attached to the carboxyl group, is claimed as an insecticide for plants.

C. T. GIMINGHAM.

XVII.—SUGARS; STARCHES; GUMS.

Electrical conductivity method of determining the ash content of raw cane sugars. F. W. ZERBAN and J. MULL (Facts about Sugar, 1926, 21, 278).—Using the apparatus described by Tödt (B., 1925, 775), the average values for content of water-soluble ash in 86 raw cane sugars were found to correspond closely with those by incineration, the individual results agreeing within 0.01% in 57% of the samples examined, and within 0.02% in 80%. In only 8 sugars was the discrepancy 0.04—0.06%, and in these probably the error is on the part of the chemical method, or is due to the samples not being uniform.

J. P. OGILVIE.

Determination of the hydrogen-ion concentration in the cane sugar industry. L. BAISSAC (Int. Sugar J., 1926, 28, 370—373).—In Mauritius using the sulphitation method, the optimum p_H after adding lime is very near to 7.0 (cf. Farnell, B., 1925, 416), and at p_H 8.5 (phenolphthalein alkalinity) settling is slower. In the control of the Bach syrup sulphitation process, good filtration was obtained at p_H 6.8—6.9.

J. P. OGILVIE.

Separation of the amyloses in some common starches. T. C. TAYLOR and H. A. IDDLIS (Ind. Eng. Chem., 1926, 18, 713—717).—By ultra-filtration through a collodion membrane, prepared by Nelson and Morgan's method (B., 1924, 235), and by electro-dialysis, a clean separation of the slimy, less soluble α -amylose from the mobile, easily dispersed,

β -amylose, in gelatinised corn (maize), rice, and potato starches has been effected. The yields by the two methods are concordant and the β -amylose is obtained in concentrations up to 8%. α -Amylose is only slowly hydrolysed by 10% hydrochloric acid, yielding on complete disintegration a flocculent residue similar to that resulting from the original starch. β -Amylose is readily hydrolysed to a clear colourless solution, with the characteristic properties of a reducing sugar, and the reaction is proposed as a criterion of purity for β -amylose, together with its α_D^{25} 186°, its clear deep blue colour with iodine, its solubility, absence of reducing properties before hydrolysis, and absence of ash. In the case of maize starch the fatty acids are found almost quantitatively with the α -amylose, whilst with potato starch, which contains appreciable amounts of phosphorus, fatty acids are found in both amyloses. The starch used was purified by Taylor and Nelson's method (B., 1920, 668A) and gelatinised with ammonium thiocyanate, the progress of gelatinisation being followed with the microscope. R. BRIGHTMAN.

Maize and potato starches for textile finishing. EKHARD.—See VI.

PATENTS.

Extraction process and apparatus. H. F. HOLZHEUER (U.S.P. 1,587,646, 8.6.26. Appl., 28.9.25).—In an extraction process where a number of extraction units are arranged in series, as in the beet sugar industry, the pressure of the extracting liquid falls off to such an extent that the process becomes uneconomically slow. The pressure cannot be raised above a certain value at the beginning, or else the first few units would choke, so the liquid is supplied at the greatest economical pressure to the first cell and later removed from the circuit and its pressure raised by means of a "booster" pump, whence it is returned to the next unit of the series. E. S. KREIS.

Refining sugar juice by chlorination. S. OOH and F. KOTERA (U.S.P. 1,591,879, 6.7.26. Appl., 3.12.24).—See E.P. 249,191; B., 1926, 560.

XVIII.—FERMENTATION INDUSTRIES.

Assimilability of the nitrogen in the nutrient solution by yeast in the aeration process. H. CLAASSEN (Z. angew. Chem., 1926, 39, 880—883; cf. A., 1926, 641).—Experiments are described on the assimilation by yeast of the nitrogen compounds in different molasses, from which it is concluded that beet-sugar molasses is a suitable raw material for the cultivation of baker's yeast. After addition of phosphoric acid better yields of good quality yeast are obtained from beet molasses than from any other raw material. This result is supported by a large-scale experiment. S. K. TWEEDY.

Enzyme purification by electro-dialysis and electro-osmosis. FRICKE, FISCHER, and BORCHERS.—See A., Aug., 791.

PATENT.

Yeast food product (U.S.P. 1,589,853).—See XIX.

XIX.—FOODS.

Effect of drying on the vitamins of milk. H. JEPHCOTT and A. L. BACHARACH (Le Lait, 1926, 6, 249—259; Chem. Zentr., 1926, I., 3510).—Vitamins in milk are not destroyed by the usual drying processes provided sound, wholesome milk is utilised. The most satisfactory drying processes are those which prevent oxidation and destruction of the vitamin-C and minimise bacterial infection by the exclusion of air. B. W. CLARKE.

Use of commercial rennet in the manufacture of cheese from whey. G. GUITTONNEAU, J. KELLING, and A. BARRET (Le Lait, 1926, 6, 170—180, 259—268; Chem. Zentr., 1926, I., 3511).—Excellent cheese can in general be made from whey by the use of commercial brands of rennet. The fundamental biochemical changes underlying the process and details of actual manufacture are described. B. W. CLARKE.

Effect of lactic acid-producing *Streptococci* on the flavour of cheddar cheese. G. J. HUCKER and J. C. MARQUARDT (New York Agr. Exp. Stat. Tech. Bull., 117, Mar., 1926. 13 pp.).—*Streptococcus paracitrovorus*, Hammer, has a favourable influence on the production of the flavour of cheddar cheese prepared from raw or pasteurised milk. *S. citrovorus*, Hammer, has no effect on the flavour, whilst *S. lactis*, Löhns, has about the same effect as commercial starters (?*S. cremoris*, Orla-Jensen). High-grade milk to which 0.23—0.24% of pure lactic acid is added produces cheese very similar to that obtained by the use of commercial starters. Certain strains of acid proteolytic cocci produce an unpleasant flavour in the cheese, which rapidly becomes soft. L. F. HEWITT.

Vitamin content of foodstuffs. W. H. EDDY (Amer. J. Pub. Health, 1926, 16, 109—115).—The determination of A-, B- and C-vitamin values of foodstuffs is discussed. Investigation of the value of the banana as an antiscorbutic (vitamin-C value) showed the protective dose to be 5 g. per guinea-pig per day. Animals fed on the same diet, believed to contain all the dietary requirements except vitamin-C, with addition of 8—10 g. of banana, grew much better than when only the protective amount of the latter was added. The banana was also found to be rich in vitamin-A, being a better source of this vitamin than lettuce and, on a dry basis, having 1/5 the value of butter in this respect. Data on green peas and cabbage are also included.

R. E. THOMPSON.

Vitamins in heat-sterilised food. C. M. DUGDALE and R. J. MUNRO (J.S.C.I., 1926, 45, 135—140t).—Finely minced mixtures of various meats of average water content 65—72% and fat 6—10% were packed in 85-g. pots, and these were

heated for a total period of 40 min. at 110°. The centre of the pot is thus kept for about 10 min. at 110°, and at 105–110° for an average of 30 min. Soups were packed in 10-oz. cans and given a total heating of one hour at 115°. These temperatures are adequate for destruction of all harmful bacteria. The foods were fed to rats which had started to lose weight on basal vitamin-free diets. The minimum quantity of minced meats sufficient to supply the daily vitamin-A necessary for a rat was found to be about 3 g. and of soups less than 10 g., and for vitamin-B, about 7 g. of meat and 5–10 g. of soup. Vitamin-A was found to be adequately supplied by 3 c.c. of milk, but for vitamin-B more than 15 c.c. were necessary, whilst 2 g. of cabbage were needed for vitamin-A, and over 4 g. for vitamin-B.
D. G. HEWER.

Detection of apple pulp in jam. W. PARTRIDGE (Analyst, 1926, 51, 346).—10 g. of jam are mixed with approximately 100 c.c. of warm water so as not to break up any whole fruit, the liquor is strained through gauze of about 20-mesh, preferably into a centrifuge tube, or into a urine sedimenting cylinder, and centrifuged for 1 min. or left to settle for 2 hrs. The deposit thus obtained is much richer in apple cells than was the original pulp. Any iodine-reacting character possessed by the apple cells at the time of manufacture persists for a long time in the jam, e.g., 39 months.
D. G. HEWER.

Determination of copper in foodstuffs. L. H. LAMPITT, E. B. HUGHES, P. BILHAM, and C. H. F. FULLER (Analyst, 1926, 51, 327–335).—A rapid method, suitable for routine sorting tests and for a range of copper from 0.07 to 0.40 mg., consists in comparing the colour formed on addition of potassium ferrocyanide to a suitably prepared solution and containing the copper salt with that obtained in a similar way from a standard solution. For more accurate work the quinosol method is recommended. Quinosol (the double sulphate of potassium and 8-hydroxyquinoline) forms a precipitate with copper salts according to the equation: $C_9H_8N(OH).SO_4K + CuSO_4 = C_9H_7N.OCu.SO_4K + H_2SO_4$. The precipitate is soluble in acids, hence the liberated acid must be neutralised, and the precipitate is then collected in a weighed Gooch filter. For confirmatory purposes the precipitate may be dissolved in strong sulphuric and nitric acids to destroy the organic nucleus, and the solution diluted and electrolysed, the copper being deposited on a weighed cathode.
D. G. HEWER.

Change in caseinogen constituent in lime-caseinogen-calcium phosphate complex, and influence of rennin on this complex. PORCHER.—See A., Aug., 795.

PATENTS.

Gelatin food. H. THIELE, Assr. to C. H. BOEHRINGER SOHN (U.S.P. 1,586,129, 25.5.26. Appl., 13.7.25).—A composition for the manufacture of gelatin foods comprises gelatin together with lactic acid, free from anhydride, absorbed in a calcium salt of lactic acid.
H. MOORE.

Manufacturing yeast from malted milk. C. B. HILL and M. H. GIVENS, Assrs. to NORTHWESTERN YEAST Co. (U.S.P. 1,589,853, 22.6.26. Appl., 14.1.25).—Yeast is allowed to act upon a nutrient medium prepared by treating a gelatinised cereal with malt enzymes, milk is added, and the product is reduced to a dry state by using a sufficiently high temperature to destroy the fermenting power of the yeast.
D. G. HEWER.

Preservation of sap-containing feeding-stuffs by the electric current. T. SCHWEIZER (Swiss P. 106,942, 10.1.24).—An electric current of 2–4 amp. per sq. m. of electrode surface is sufficient, and reduces the risk of decomposition or oxidation during the process.
B. W. CLARKE.

XX.—ORGANIC PRODUCTS; MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Strength of digitalis preparations. IV. **Effect of alcohol.** C. DE L. VAN WIJNGAARDEN (Arch. Exp. Path. Pharm., 1926, 114, 21–31).—Exhaustive extraction of powdered digitalis leaves is obtained in the preparation of the 0.5% aqueous infusion of the Dutch Pharmacopœia and of the 10% tincture prepared with cold alcohol and in fractional extraction with cold water and 50% alcohol, i.e., from the residues no appreciable amount of active glucoside can be subsequently extracted. Treatment of powdered digitalis leaves with alcohol vapour or warm alcohol, preferably by the so-called “stabilising” process causes an appreciable increase in the effective action of the digitalis powder (as measured by the lethal dose) and the preparations obtained on subsequent extraction or infusion are appreciably stronger. The effect is independent of the temperature at which the leaves are dried. More active solutions are obtained by Soxhlet extraction with absolute alcohol than by the infusion or tincture methods (cf. B., 1926, 607). Digitalis leaves which have been dried at a low temperature, e.g., at 15° or 30°, show an increase of activity on keeping for a long period.
R. BRIGHTMAN.

Hydroxylamine hydrochloride for the quick determination of acetone. M. MARASCO (Ind. Eng. Chem., 1926, 18, 701–702).—Rapid and concordant results can be obtained by the hydroxylamine hydrochloride method for the determination of acetone, using the following procedure and the factor 1.057. A sample of the liquid under test, containing not more than 0.2 g. of acetone, is run from a pipette into 400 c.c. of 0.2% hydroxylamine hydrochloride solution, neutral to methyl-orange. The mixture is titrated with standard alkali till nearly neutral, when it is stirred and after 20 sec. again titrated. The procedure is repeated until no appreciable amount of acid is liberated on keeping for 1 min., the end-point being determined by comparing the colour with a blank by light reflected from a white background. The method may be adapted to the determination of acetone in vapours by aspirating the gases under test through cold (15°)

hydroxylamine hydrochloride solution, or shaking a measured volume of the sample with the same reagent. Camphor does not affect the titration and alcohol up to 2.5% is also without effect. Some aldehydes, such as formaldehyde, may also be determined with hydroxylamine hydrochloride by this method.

R. BRIGHTMAN.

Determination of alcohols and phenols in essential oils by means of magnesium methyl iodide.—T. ZEREVITINOV (Z. anal. Chem., 1926, 68, 321—327).—All the alcohols and phenols that usually occur in essential oils react with magnesium methyl iodide with the evolution of methane equivalent to the hydroxyl groups present. Organic acids react similarly but the ketones which may be present, with the exception of acetone, are inert. To determine the alcohols and phenols in an oil, therefore, about 0.2 g., previously dehydrated over anhydrous sodium sulphate, is dissolved in 15 c.c. of anhydrous toluene or xylene and 5 c.c. of an ethereal solution of magnesium methyl iodide are added; the volume of methane evolved is calculated to hydroxyl and the hydroxyl due to the acids present (determined by titration of a second sample with potassium hydroxide) is deducted. From the remainder the percentage of alcohol or phenol is calculated.

A. R. POWELL.

Erratum.—B., 1926, July 9, p. 565, col. 1, line 2 from top, after "cooled" insert "in a bath at a temperature."

Reactions of alcohols over zinc oxide catalysts. ADKINS and LAZIER.—See A., Aug., 807.

Reduction of carbon monoxide under ordinary pressure. JAEGER and WINKELMANN.—See II.

PATENTS.

Manufacture of derivatives [saturated or unsaturated dialkylamides] of pyridine-3-carboxylic acid. SOC. OF CHEM. IND. IN BASLE (E.P. 244,747, 5.12.25. Conv., 20.12.24).—The compounds are produced by the action of saturated or unsaturated dialkylamines upon quinolinic anhydride, a dialkylamine salt of quinolinic acid dialkylamide being produced at first, which on further heating splits up into pyridine-3-carboxylic acid dialkylamide, carbon dioxide, and the dialkylamine. For example, a mixture of 1 pt. of quinolinic anhydride and 3 pts. of diethylamine is boiled for 2 hrs. under a reflux condenser and excess of diethylamine is removed by distillation; the residue is heated to 180° until no more carbon dioxide is evolved, and pyridine-3-carboxylic acid diethylamide is recovered from the product by distillation *in vacuo*. The *dialkylamide*, *methylpropylamide*, and *ethylpropylamide* of nicotinic acid are water-soluble oils having b.p. 147°/3 mm., 174°/16 mm., and 173°/15 mm., respectively.

L. A. COLES.

Manufacture of hydrogenated di[hydr]oxydiphenylmethane compounds. CHEM. FABR. AUF. ACTIEN (VORM. E. SCHERING), and H. JORDAN

(E.P. 252,594, 9.9.25).—Hydrogenated *pp*-dihydroxydiphenylmethane derivatives, of general formula $(HO-C_6H_4)_2CR'R'$ and $(HO-C_6H_4)_2CR'R'$, in which R and R' are either the same or different aryl or alkyl groups, are obtained by the action of hydrogen in the presence of a catalyst on condensation products of a ketone with a phenol. Thus *pp'*-dihydroxydiphenyldimethylmethane ($\beta\beta$ -4:4'-dihydroxydiphenylpropane), from acetone and phenol, on hydrogenation at 170—180° and 10—15 atm. with a nickel catalyst (5 pts.) yields β -*p*-hydroxyphenyl- β -4-hydroxycyclohexylpropane, b.p. 213°/0.8 mm. In the presence of colloidal palladium at 50° complete saturation yields a mixture of bis- β -4-hydroxycyclohexylpropanes, b.p. 102—106°/12 mm., having an odour of lily of the valley and probably consisting of a mixture of *cis*, *cis-trans*, and *trans-trans* isomerides. At 150—170° in the presence of nickel bis- $[\beta$ -6-hydroxy-*m*-tolyl] propane similarly yields β -6-hydroxy-*m*-tolyl- β -4-hydroxy-3-methylcyclohexylpropane, b.p. 218°/0.8 mm., when the reaction is stopped after six atoms have been absorbed, and on complete saturation a mixture of stereoisomeric bis- $[\beta$ -3-methyl-4-hydroxycyclohexyl]propanes, b.p. 108—112°/12 mm., having an odour of hyacinths. The condensation product of phenol and methyl ethyl ketone similarly yields a mixture of stereoisomeric bis- $[\beta$ -4-hydroxycyclohexyl]butanes, b.p. 120—125°/14 mm.

R. BRIGHTMAN.

Production of glucosides of *Digitalis*. C. H. BOEHRINGER SOHN, Assees. of F. RAHN (U.S.P. 1,586,116, 25.5.26. Appl., 13.7.25).—An aqueous extract of *Digitalis* leaves is extracted with butyl or amyl alcohol or other alcohol difficultly soluble in water, most of the alcohol is removed by evaporation under reduced pressure, and digitalein and gitalin are precipitated from the residue by addition of ether. The precipitate is treated with chloroform, in which gitalin alone is soluble, and one from which it is precipitated with ether or light petroleum. The glucosides may also be separated by removing gitalin from the aqueous extract with chloroform, and then recovering digitalein by extraction of the aqueous liquor with a higher alcohol.

T. S. WHEELER.

Producing tuberculin. K. YOSHIZAWA (U.S.P. 1,586,937, 1.6.26. Appl., 11.5.25. Conv., 17.2.25).—Tubercle bacilli are cultivated in glycerol bouillon for two months and the culture, after sterilisation at 70°, is concentrated to one-tenth of its bulk, 70—80% of alcohol is added, and the liquid filtered after 24 hrs. The alcohol is evaporated off and the residual liquid is made slightly alkaline and digested with pancreatin at 37° until all the "tuberculin reactive constituent" as tested by Pirquet's or Römer's reaction has been destroyed. The product is fractionally sterilised at 63° to destroy the pancreatin and is then tested for bacilli by cultivation aerobically and anaerobically on glucose-agar for one week. The product is of therapeutic value in the treatment of tuberculosis especially skin tuberculosis and may be administered in doses 10,000 times as great as the normal tuberculin dose without injurious effects.

T. S. WHEELER.

Basic phenol alkyl ethers. H. HAHL, Assr. to WINTHROP CHEM. CO., INC. (U.S.P. 1,587,073, 1.6.26. Appl., 22.8.24. Conv., 21.9.23).—Phenols containing an unsaturated radical in the *o*-position to the hydroxyl group are treated with an alkaline reagent and a basic alkyl monohalide or a basic alkylene dihalide to yield the corresponding basic alkyl ethers, which are colourless or yellowish liquids of therapeutic value as substitutes for *Secale cornutum*, and form stable crystalline salts with acids, which are soluble in water and may be injected subcutaneously in aqueous solution. For example, 1.3 pts. of sodium dissolved in 50 pts. of alcohol are heated with 10 pts. of 8-hydroxy-7-allylquinoline and 10 pts. of β -diethylaminoethyl chloride until neutral, when the liquid is poured into water, and the oil obtained is separated, dried, and distilled. 8- β -Dimethylaminoethoxy-7-allylquinoline forms a yellowish liquid, b.p. 215—217°/20 mm. 2- β -Diethylaminoethoxy-3-allylanisole has b.p. 161—165°/12 mm., 2- β -diethylaminoethoxy-1-allylnaphthalene has b.p. 162—168°/10 mm., 2- β -diethylaminoethoxy-3-crotonylanisole has b.p. 174—178°/12 mm., and 2- β -dimethylaminoethoxy-3-allylanisole has b.p. 152—153°/12 mm. T. S. WHEELER.

Anthelmintic remedy. W. KROPP, W. SCHRANZ, and W. SCHULEMANN, Assrs. to WINTHROP CHEM. CO., INC. (U.S.P. 1,587,077, 1.6.26. Appl., 29.11.24. Conv., 9.2.23; cf. G.P. 406,532; B., 1925, 474).—*o*-Benzylphenol is a valuable non-irritant anthelmintic, and its effects are enhanced by adding to it a substance which renders it liquid in the animal body. *p*-Benzylphenol which is formed in the manufacture of the *o*-compound is a suitable addition: it may be added to form 50—25% of the mixture. T. S. WHEELER.

Nitration process [for petroleum distillates]. M. B. HOPKINS, Assr. to STANDARD DEVELOPMENT Co. (U.S.P. 1,588,027, 8.6.26. Appl., 18.3.22).—1400 pts. of an octane fraction of petroleum boiling at 125—130° are mixed with 1000 pts. of 94% aluminium nitrate and 600 pts. of 68% nitric acid. The mixture is heated to 130—140° in an oil bath. The aluminium nitrate and nitric acid form a viscous layer on which the hydrocarbon floats. Hydrocarbon, nitric acid, and water distil off, the hydrocarbon being condensed and returned to the mixture. The resulting 950 pts. of reaction mixture are steam-distilled, yielding 370 pts. of crude mononitro-derivative and 580 pts. of unchanged hydrocarbon. The crude reaction product can be used as a solvent for cellulose derivatives and resins without separating. E. S. KREIS.

Preparation of di-substituted thioureas [thiocarbamides] of symmetrical structure. SILESIA VEREIN CHEM. FABR., Assees. of FLEMMING & KLEIN WISSENSCH. CHEM. LABORATORIUM (E.P. 244,070, 13.11.25. Conv., 6.12.24).—See U.S.P. 1,577,797; B., 1926, 464.

Synthesis of organic compounds [from carbon monoxide]. J. Y. JOHNSON. From BADISCHE

ANILIN & SODA FABR. (E.P. 254,819, 9.3.25).—See U.S.P. 1,562,480; B., 1926, 512.

Manufacture of alkyl halides. J. P. WIBAUT (U.S.P. 1,591,151, 6.7.26. Appl., 2.1.24. Conv., 12.1.23).—See E.P. 209,722; B., 1924, 731.

Poly-iodinated isatins. CHEM. FABR. AUF ACTIEN (VORM. E. SCHERING), Assees. of W. SCHOELLER and K. SCHMIDT (U.S.P. 1,592,386, 13.7.26. Appl., 24.11.25. Conv., 10.12.24).—See E.P. 244,443; B., 1926, 514.

Manufacture of medicinal oil preparations [emulsions]. H. E. POTTS. From DOUGLAS PECTIN CORP. (E.P. 252,476, 5.3.25).

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Photographic solarisation. H. BELLIOU (Compt. rend., 1926, 183, 203—205).—Comparison of two identical solarised plates one of which had been developed and fixed and the other left as it was shows that to the solarised portions in the former there correspond blackened portions in the latter, a phenomenon which is absent in photographic inversion by the red and infra-red (cf. B., 1926, 693). With increase in the time of exposure the density of the solarised areas decreases, whereas that of the blackened areas increases. The wave-length producing maximum density for normal exposure is slightly greater than that producing maximum solarisation.

R. CUTHILL.

Thiocarbamide fog and a suggested explanation of Waterhouse reversal. S. O. RAWLING (Phot. J., 1926, 66, 343—351).—The complexes formed by the action of thiocarbamides on silver bromide are decomposed in presence of low concentrations of alkali giving silver sulphide. The decomposition is hindered by the presence of soluble bromides. Assuming that silver sulphide particles on the grains in an emulsion can act as development centres, Waterhouse reversal is explained as follows: bromide set free by development of the latent image in a lightly exposed part of a plate suppresses the fogging action of thiocarbamide (in the alkaline developer) to such an extent that the sum of the densities of image and fog is less than that due to fog alone in an unexposed part of the plate. Comparing the fogging properties of an emulsion containing silver bromide-thiocarbamide complex with those of a similar emulsion containing silver sulphide, the curves representing growth of fog with time of development show in the former case the characteristic form due to the consecutive reactions (*a*) formation of silver sulphide and (*b*) development of grains infected by the silver sulphide. W. CLARK.

See also A., Aug., 774, Spectral sensitivity of chromates with organic substances (EDER). 796, Grain size and quantum theory of photographic exposure (HYLAN). 808, Photochemical decomposition of silver iodide (HARTUNG).

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Photographic silver halide emulsions. A.-G. FÜR ANILIN-FABR. (E.P. 246,800, 22.10.25. Conv., 31.1.25).—With the object of permitting a high speed to be obtained without the fog which normally accompanies prolonged ripening of an emulsion, a thiazole compound, *e.g.*, 0-125% of Thiazole Yellow, is added to the gelatin before preparing the emulsion. W. CLARK.

Sensitising photographic silver-halide emulsions for X-rays. R. SCHWARZ (G.P. 428,898, 13.11.25).—A thallium compound of low solubility, *e.g.*, thalious bromide, is added to the silver halide. The sensitivity is more than doubled. W. CLARK.

Copying drawings, printed matter, etc. by photography. A.-G. FÜR ANILIN-FABR. (E.P. 249,467, 17.9.25. Conv., 21.3.25).—An unfixed negative, developed on a non-hardened, slow emulsion of medium thickness, is washed and immersed in a solution of water, 1000 pts., potassium ferricyanide, 100 pts., ferric chloride, 20 pts., and potassium bromide, 15 pts. In this way there is formed on the silver-containing parts a loose deposit of Prussian blue, which prevents penetration of the hardening agent (ferric chloride), while in the unexposed parts of the negative the gelatin is hardened. On washing, the deposit is rinsed away from the exposed parts but adheres to the hardened unexposed parts owing to the mordant action of the ferric chloride. The plate is subsequently fixed and again washed. Alternatively, if the unexposed areas are relatively extensive, the plate is treated in a 25% solution of potassium ferrocyanide to convert the ferric chloride in the hardened parts into Prussian blue. The unhardened, exposed parts can be washed out with warm water, and the covering power of the hardened parts increased by dyes. Other suitable salts, *e.g.*, those of uranium, can replace the iron salts. W. CLARK.

Production of photographic image in colours on fabric. M. MICHEL (G.P. 427,505, 3.5.25).—The image produced on the material is developed with a tannic acid solution and the tannic acid salt thus produced is dyed in acid solution with basic dyes. Blue-print tracings are first bleached with an alkaline liquid. R. BRIGHTMAN.

Bleaching agent for the "Bromoil" process. E. MAYER (G.P. 426,661, 29.7.25. Conv., 1.12.24).—Betaine hydrochloride is added to the solution of copper sulphate, an alkali dichromate, and a soluble chloride, such as sodium chloride, or potassium bromide used as a bleaching agent in the "Bromoil" process. R. BRIGHTMAN.

Photomechanical printing surface and process. D. DE NAGY (U.S.P. 1,591,369, 6.7.26. Appl., 2.4.25. Conv., 4.4.24).—See E.P. 236,621; B., 1925, 786.

XXII.—EXPLOSIVES; MATCHES.

Laws of combustion of colloidal powders. H. MURAOUR (Bull. Soc. chim., 1926, [iv], 39, 841—846).—The general results of experiments on

the combustion of insoluble nitroglycerin powders are recorded. The laws of the combustion are independent of the explosion temperature. Theoretically, the pressure is a logarithmic function of the explosion time, and it is shown that between explosion pressures of 500 kg. and 200 kg. below the maximum pressure, the experimental curve may be replaced by the theoretical logarithmic curve, the progression ratio ($q = e^n$, where $e = 2.718$) being taken as the mean ratio for the experimental curve between the two points considered. The area bounded by the curve is inversely proportional to the thickness of the powder layer and is also approximately inversely proportional to the heat of decomposition of different powders under the same conditions of density and thickness. For the same powder the ratio (maximum pressure) / n is constant, K , and the quotient K / (thickness of layer) is a constant depending on the chemical composition of the powder. The energy furnished per cm.² of powder is constant for the same thickness. S. K. TWEEDY.

Influence of temperature on the energy of the combustion of powders. H. MURAOUR (Bull. Soc. chim., 1926, [iv], 39, 846—852).—The decomposition temperatures of nitroglycerin powders previously heated at 110° were obtained from the pressure-time curves determined by combustion in a bomb at ordinary temperatures and at 110° (cf. preceding abstract). Curves are also given connecting the energy of combustion with the preliminary heating temperature for powders decomposing at 250° and 340°; the possible mechanism by which the preliminary heating affects the energy of the reaction is considered. Nitrocellulose powders are less sensitive to temperature changes than nitroglycerin powders. S. K. TWEEDY.

Laws of combustion of colloidal powders. I. H. MURAOUR (Bull. Soc. chim., 1926, [iv], 39, 981—988).—As a preliminary to investigating the validity of Frankland's "layer" theory of combustion of explosive powders, the laws governing the combustion of such powders in closed vessels are investigated (cf. preceding abstracts).

S. K. TWEEDY.

Nitration of various cellulose. G. MORIN (Mém. Poudres, 1926, 22, 57—68).—The possibility of replacing the varieties of cotton normally used in the manufacture of nitrocellulose by other cellulosic material was investigated during the war at the Angoulême powder factory. Among the sources of cellulose tried were various varieties of wood pulp, bamboo cellulose, jute, carex, rags, long-fibre cotton, cotton dust, blotting paper, and cotton which had been treated with sodium sulphite instead of with soda and chlorine. Tables are appended in which the purification, analysis, methods of nitration and stabilisation, stability and yield of nitrocellulose are given for each material. Cotton linters washed and bleached in the usual way can be replaced by linters washed in sodium sulphite or by rags and at least partly by certain washed and bleached celluloses such as those from pine and bamboo. S. BINNING.

Examination of nitrocellulose in polarised light. TISSOT (Mém. Poudres, 1926, 22, 31—56).—Nitrocelluloses with various nitrogen contents were obtained by nitrating cellulose with four types or mixed acid and were examined microscopically in polarised light. The colours of the nitrocelluloses varied with their nitrogen content, being yellow for the least nitrated and light blue for the most highly nitrated samples. The intermediate colours were violet-red and deep blue. Unnitrated cotton showed an iridescence which was absent from nitrocellulose. Examination in polarised light is suggested as a method for testing the homogeneity of samples of nitrocellulose and for estimating approximately the nitrogen content. To obtain consistent results certain precautions are necessary, the chief of which is the use of artificial illumination, preferably the Auer light. S. BINNING.

Waltham Abbey test for cordite powders. P. T. VIGNAU and R. T. BABUGLIA (Rev. Fac. Cien. Quim., 1925, 3, 47—50).—Contradictory results obtained by the Waltham Abbey test arise from variations in the details of the technique followed. It is apparently unnecessary to use silvered vessels for the test. The vessels and the powder should be absolutely free from moisture. Electrical heating and the recording of temperatures by means of a thermograph are desirable. G. W. ROBINSON.

Analysis of explosives. Apparatus for the 135° test. P. T. VIGNAU and J. ANGLI (Rev. Fac. Cien. Quim., 1925, 3, 51—53).—An apparatus for determining the stability of explosive powders at 135° is described. It is specially designed to avoid the loss of vapours and to minimise the effects of explosions. C. W. ROBINSON.

PATENTS.

Explosive. W. O. SNELLING, ASS. to TROJAN POWDER Co. (U.S.P. 1,588,277, 8.6.26. Appl., 11.12.24).—A filling composition for gas shells comprises nitrostarch, a liquid or solid toxic substance, such as diphenylcyanoarsine, and if desired a binder *e.g.*, lubricating oil, and an oxidising agent, *e.g.*, sodium nitrate. If the toxic substance is liable to decomposition by the heat of explosion a flame reducer such as oxanilide is added. Chlorinated hydrocarbons, such as carbon tetrachloride, may also be used; when the explosion takes place these are decomposed with formation of toxic compounds, such as phosgene. T. S. WHEELER.

[Smokeless] explosive mixture. A. E. SCOTT (U.S.P. 1,589,237, 15.6.26. Appl., 26.12.22).—Picric acid (16 pts.), alum (12 pts.), ammonium carbonate ($\frac{3}{8}$ pt.), and potassium chlorate ($\frac{1}{8}$ pt.) are dissolved in boiling water and the solution is cooled. The crystalline product which separates forms a safe, stable, practically smokeless blasting explosive. By varying the proportions of the ingredients it can be adapted for use in small arms or heavy ordnance. T. S. WHEELER.

Recovering nitric acid from waste acid (U.S.P. 1,590,043).—See VII.

XXIII.—SANITATION; WATER PURIFICATION.

Use of aluminium hydroxide sol [in water purification]. E. W. JOHNSTON and F. P. DOWNEY (Canad. Eng., 1926, 50, [10], 94C—94D).—The successful use of aluminium hydroxide sol in the treatment of water is described. The sol was prepared by the method described by Coxe (B., 1923, 945 A). One grain of the sol per gal. reduces the alkalinity of the water 1 p.p.m. The analysis of the water being treated is as follows (in p.p.m.): total solid 24, alkalinity (methyl-orange) 18, iron 3.4, carbon dioxide 3.5, hydrogen sulphide 2.0, oxygen consumes 8.0, colour 210—350. The p_H value of the water is 6.8, and it has a very strong odour and taste of hydrogen sulphide. Alum in amounts up to 10 grains per gal. and soda ash in amounts up to 4 grains per gal. failed to give a colourless effluent. Addition of the aluminium hydroxide sol in quantity corresponding to 6 grains of alum per gal. reduced the colour to 8 and the oxygen consumed to 0.5 p.p.m., and entirely eliminated the odour and taste. It is estimated that a saving of \$21 per million gallons treated is effected by substituting aluminium hydroxide sol for aluminium sulphate. R. E. THOMPSON.

Colloid chemistry in [water] filtration. A. V. DELAPORTE and F. R. MANUEL (Canad. Eng., 1926, 50, [10], 94A—94C).—When "filter alum" is added to water the aluminium ions effect the precipitation of the negatively charged disperse phase and the sulphate ions coagulate the colloidal aluminium hydroxide subsequently formed. Carbonate ions, if present in sufficient concentration, also have a coagulating effect on the colloidal aluminium hydroxide and are adsorbed by the floc in the same manner as sulphate ions. Bacteria, colour, and organic matter are adsorbed by the colloidal hydroxide and are removed with the flocculent precipitate formed. R. E. THOMPSON.

Precise turbidity readings by electrical methods. L. H. SCOTT (J. Amer. Water Works Assoc., 1926, 15, 697—698).—The turbidity of raw influent water to a plant is ascertained by use of apparatus comprising a water tube, an electric lamp, a photo-electric cell, and a very sensitive galvanometer. A small portion of the influent water is made to circulate through the water tube, which is sealed at both ends with a convex lens. Under the lower lens the electric light is placed and at the top is placed the photo-electric cell in a light-tight compartment so arranged that the light from the tube will focus on the plate of the cell. The cell is made so that the resistance will vary in direct proportion as the square of the light thrown on it. As the turbidity changes the corresponding variation in the resistance is recorded on the galvanometer, the scale of which is calibrated to be read in turbidities. W. T. LOCKETT.

Reaction of *o*-tolidine with surface waters. O. FORSBERG (J. Amer. Water Works Assoc., 1926, 15, 706—708).—A number of surface waters containing iron and manganese gave a colour reaction with

o-tolidine. Waters containing only iron compounds when these do not exceed 10 p.p.m. do not react with *o*-tolidine, but waters containing even very small amounts of manganic hydroxide (0.5—2.0 p.p.m.), give a colour reaction similar to that produced with free chlorine. W. T. LOCKETT.

Cause and correction of red water troubles. T. SAVILLE (Water Works, 1926, 65, 75—84).—Increase in hydrogen-ion concentration due to carbonic acid does not influence the rate of corrosion until the p_H is less than 5.5, below which nearly all the free carbon dioxide is aggressive. Coagulation with alum, by increasing the free carbon dioxide, increases the corrosiveness of a water. A further effect of coagulation and filtration is the removal of organic matter, which may otherwise form a protective coating. This may explain the increase in corrosiveness of some waters following simple slow sand filtration. Waters coagulated with iron sulphate and lime are ordinarily non-corrosive. The corrosiveness of water is greatly increased by heating, due chiefly, it is believed, to decrease in viscosity, permitting an increased rate of diffusion of oxygen to the walls of the vessel, and also to convection currents which loosen the rust deposits. The addition of sufficient lime, soda ash, or caustic soda to produce a p_H of 7.0—7.5 will usually reduce corrosion to a minimum, although for complete removal of carbon dioxide a p_H of 8.5 is required. Protective coatings of lead will protect pipes from corrosion and will not cause lead poisoning when the p_H of the water is above 9—10. R. E. THOMPSON.

Manganese in the Amsterdam dune water supply. C. A. H. VON WOLZOGEN-KÜHR (Water en Gas, 1926, 31—34, 39—43; Water and Water Eng., 1926, 28, 216).—Data are given on the occurrence of manganese in the mud and water of the Oranjekom and canals. The water contains 0.3 p.p.m. and the mud 0.1% of manganese, which is present as manganese dioxide in the latter case. The oxidation of manganese compounds to manganese dioxide, which undoubtedly occurs in the canals and rough filters, was shown to be due to manganese bacteria. Experiments with an artificially prepared solution of manganese carbonate in dune water showed that the oxidation of manganese compounds by the oxygen of the air does not take place at the p_H obtaining, namely, 8.1. Manganese bacteria were found to be capable of oxidising dissolved manganese not only in alkaline solution (p_H 10) but also in acid solution (p_H 4—5). Fresh gravel in rough filters at Leiduin became dark brown in course of time due to deposited iron and manganese oxides. The manganese oxide itself is also capable of absorbing manganese compounds from water. Fresh filters at first retain all manganese, then manganese begins to appear in the effluent, disappearing again in a few weeks. This is explained by the fact that development of the bacteria is insufficient to deal with all the manganese present until the latter stage is reached. The colour of manganese dioxide is less noticeable in fine sand filters owing to the relatively greater surface. R. E. THOMPSON.

Graphical chemistry in water softening. R. L. MCNAMEE (Water Works, 1926, 65, 285—290).—Nomographic and alinement charts are given for simplifying the solution of problems encountered in water analysis and water-softening investigations. R. E. THOMPSON.

Anti-microbial properties of various river and sea waters. Bacteriophagic powers. F. ARLOING, SEMPE, and CHAVANNE (Bull. Acad. Med., 1925, 43, [7]; Pub. Health Eng. Abs., 1926, W—8).—The anti-microbial power was found to vary in intensity and at times in specificity. It is usually greater in river water below cities, is increased or disturbed by floods, and is diminished and tends to disappear when the water is filtered through an L 3 filter candle and stored in the dark in a sealed tube for one month. Spring waters possess feebler bactericidal powers than polluted river waters. R. E. THOMPSON.

Rate of deoxygenation of polluted waters. E. J. THERIAULT (Publ. Health Rep., 1926, 41, 207—217).—The "excess oxygen" method of determining the biochemical oxygen demand and the applicability of the results obtained to the study of stream pollution were investigated. Agreement between duplicate samples was excellent. After incubation for 16 days the rate of deoxygenation showed a marked acceleration and, contrary to the general view, appreciable quantities of oxygen continued to be absorbed even after 20 days. This cannot be attributed to approaching exhaustion of dissolved oxygen as the phenomenon has also been observed with fully aerated samples. Within wide limits, the rate of deoxygenation is independent of the amount of dissolved oxygen present. The evidence accumulated supports the hypothesis that under aerobic conditions the stabilisation of organic matter proceeds in two distinct and strictly consecutive stages; only after the carbonaceous matter is oxidised does nitrification set in. When only the first or carbon-oxidation stage is considered, Phelps' formula for the rate of deoxygenation gives values in reasonable agreement with experimental results. The 5-day values had a definite significance for relatively short periods of incubation, but after about 15 days' incubation the rate of deoxygenation increased markedly, the oxygen demand of the more highly oxidised sample being apparently twice as great as that of the same sample in a less highly purified state. The significance of this observation in the determination of percentage removal of organic matter by treatment plants is readily apparent, as in the extreme case in question the percentage values obtained would be in inverse relation to the purification actually accomplished. On the basis of nitrite, nitrate, and free ammonia determinations, it is probably safe to conclude that at 20° the oxidation of the purely nitrogenous impurities is virtually complete in 40—50 days. Appreciable quantities of dissolved oxygen, however, continue to be absorbed even after several months' incubation, probably due to slow oxidation of cellulose-like materials. After

30 days' incubation at 20° the rate of deoxygenation is practically constant.

R. E. THOMPSON.

Rate of atmospheric re-aeration of sewage-polluted streams. H. W. STREETER (Pub. Health Rep., 1926, 41, 247—262; cf. B., 1925, 565).—The re-aeration of flowing streams proceeds substantially in accordance with the physical laws governing absorption of gases. The rate of re-aeration is controlled mainly by the temperature, turbulence of flow, and the oxygen saturation deficit of the stream. An empirical method of measuring the rate of re-aeration is developed which gives results that appear to be consistent with known facts concerning the physical conditions influencing such rates, and by means of which reasonably accurate calculation may be made of progressive changes in the dissolved oxygen content of a stream under any given or assumed condition of flow, temperature, and initial pollution. The presence of sludge deposits and the density of pollution of the stream proper are important factors in determining the ability of a watercourse to recover its reserve supply of oxygen.

R. E. THOMPSON.

Investigation of pollution of Flambeau River at Park Falls. WISCONSIN RAILROAD COMMISSION (Pub. Health Eng. Abs., 1926, S.S.I.—11).—The evidence presented in a case concerning pollution of a stream by wood pulp and paper mill wastes is summarised. Reduction of dissolved oxygen below 2 p.p.m. for any material length of time will result in death of fish. Gas plant wastes and mine drainage are toxic to fish.

R. E. THOMPSON.

Influence of soft and of hard waters on the decomposition of sewage. J. E. PURVIS (Surveyor, 1926, 69, 277—278).—Sewage mixed with soft (distilled) water was oxidised at a much higher rate than when mixed with hard water (18.5—25°), the free and albuminoid ammonia and oxygen consumed values after aeration being lower in the former mixtures than in the latter. The nitrite content was irregular but the nitrates were invariably higher with the soft water. The hard water mixtures were also more opalescent in appearance, probably due to precipitation of colloidal matter. This would increase the amount of sludge deposited during tank treatment, thus reducing the load on the subsequent treatment processes employed. The importance of these factors in comparing the efficiency of plants and purification processes is emphasised.

R. E. THOMPSON.

Relation between ripe [sewage] sludge and incoming fresh solids. W. RUDOLFS, H. HEUKELEKIAN, and P. J. A. ZELLER (Amer. J. Pub. Health, 1926, 16, 365—368).—A study of the influence of the rate of addition of fresh solids to digesting sludge in Imhoff tanks showed that when 2 pts. of fresh solids are added daily to 98 pts. of ripe sludge on the dry basis, digestion takes a normal course, while when 3 pts. are added digestion is impaired. With addition of 4% of fresh solids the sludge changes colour gradually from black to a peculiar greenish hue and

later to yellowish-brown, becoming acid with an obnoxious odour. The experiments indicated that approximately 30 days are required for minimum satisfactory digestion under favourable conditions. Foaming appears to be primarily caused by an incorrect relation between old sludge and fresh solids.

R. E. THOMPSON.

Sewage disposal at Milwaukee. J. A. WILSON (Water Works, 1926, 65, 115—121).—The plant consists of coarse bar screens, grit chambers, aeration tanks, and sedimentation tanks. The aeration period is 6 hrs. and the amount of air applied is equivalent to 1.5 cub. ft. per U.S. gal. of raw sewage. The effluent from the aeration tanks is retained in the sedimentation tanks for 30 min. and 90% of the settled sludge is returned to the incoming sewage. The sewage contains approximately 250 p.p.m. of suspended matter and the returned sludge increases this 10-fold. The remainder of the sludge is dewatered by filter-pressing. When the temperature of the sewage is above 20° the sludge is coarse enough to filter-press satisfactorily, but in winter when the temperature is as low as 7° chemical treatment is necessary prior to pressing. The relative filtering efficiency of the sludge is determined by filtration through Büchner funnels with the aid of vacuum. Treatment of February sludge with sulphuric acid to reduce p_H from about 7.8 to 3.4, the isoelectric point of plain sludge, increases the filtering efficiency, and addition of 0.1 g. of aluminium sulphate per 1 g. of dry solids in the sludge and adjusting p_H to 4.4, which has been found to be the isoelectric point of the mixture of alum and sludge, effects an additional increase in efficiency of about 50%, but the rate is still too low to give satisfactory results. The application of heat remarkably improves the filtering condition of both the acid- and the alum-treated sludge. The optimum temperature for acid-treated sludge is 88°, but the filtering efficiency of alum-treated sludge increases with rising temperature up to 100°. The sludge press-cake, after mixing with an equal quantity of previously dried sludge to prevent balling, is passed through Atlas direct-indirect-heat continuous rotary dryers, which reduce the moisture content from about 80% to 5—10% in 45 min. When mixed with potash and phosphate the sludge is a satisfactory complete fertiliser.

R. E. THOMPSON.

Recent research in sewage disposal. F. A. DALLYN and A. V. DELAPORTE (Canad. Eng., 1926, 50, 193—195, 213—215).—The work of the Experimental Station of the Dept. of Health of Ontario is reviewed. Digestion of activated sludge has been successfully carried out in a tank serving the combined function of a digestion chamber and storm flow tank. The iron content of activated sludge is of importance; a sludge of high iron content (5% as compared with 2%, dry basis) gives increased nitrification and clearer effluents, settles more rapidly, remains stable for fairly long periods, and has a higher nitrogen content. During an enforced period of inactivity of the aerating equipment of a small activated sludge plant, chlorine was successfully

used to reduce the odours due to putrefaction without interfering with the operation of the plant. The returned sludge has since been continuously heavily treated with chlorine without disturbing the purification process. Chlorine is a useful conditioning agent and sludge so treated does not putresce.

R. E. THOMPSON.

Combined determination of oxygen absorbed and albuminoid ammonia in sewages and effluents. J. W. H. JOHNSON (Analyst, 1926, 51, 345).—Ammonia is distilled off as usual, and to approximately 250 c.c. of liquid 25 c.c. of 20% sodium hydroxide solution and usually 20 c.c. of 0.125*N*-potassium permanganate solution are added. After heating under a reflux condenser for 30 min., and cooling, the solution is made up to 500 c.c. and two portions of 50 c.c. each are acidified, potassium iodide is added, and each titrated with 0.0125*N*-sodium thiosulphate solution. Each result gives the oxygen absorbed by one-tenth of the original volume of sample taken. The remaining 400 c.c. are returned to the flask, the ammonia is distilled off, and the distillate nesslerised; the albuminoid ammonia from four-fifths of the volume of sample taken is thus obtained. This is slightly greater than the ordinary Wanklyn value. D. G. HEWER.

Determinations of air dustiness with the sugar tube, Palmer apparatus, and impinger, compared with determinations with the konimeter. S. H. KATZ, G. W. SMITH, and W. M. MYERS (J. Ind. Hyg., 1926, 8, 300—306; cf. Greenberg, B., 1925, 1009).—The various forms of apparatus are described, and reasons given for the divergent results obtained with the same dust-carrying air. The ratio of the number of particles as determined by means of the konimeter to the numbers determined by the other methods diminishes as the amount of dust present increases. The relation is expressed by $y = ax^b$, where y = particles determined by the konimeter, x = particles determined by the other method, and a and b are constants for each kind of dust. Values of a and b are given for dusts of coal, grain, iron, limestone, silica, and granite.

S. I. LEVY.

Effect of turbulent air motion and of humidity on the stability of dust, fume, and smoke clouds. P. DRINKER, R. M. THOMSON, and (Miss) J. L. FINN (J. Ind. Hyg., 1926, 8, 307—313).—Turbulent motion has no effect on silica dust, a marked effect on fresh zinc oxide dust, and a considerable effect on tobacco smoke. Steam jets had a marked effect on silica and zinc oxide dusts. Increasing the humidity of the air before introducing the suspension caused zinc oxide to settle out more rapidly, but the effects on silica dust and tobacco smoke were inconsiderable.

S. I. LEVY.

Coal gas poisoning. DOLLINGER.—See II.

Prevention of lead poisoning in industry. KLEIN.—See XIV.

PATENTS.

Indicating the progress of chemical reactions [water softening]. R. S. MCNEIL, Assr. to COCHRANE CORP. (U.S.P. 1,587,782, 8.6.26. Appl., 3.1.24).—The softening of water by means of a zeolite-like material is controlled by leading off a small quantity of the treated water and treating it in a test-chamber with a liquid containing in solution a reagent which will form an insoluble precipitate with the substances causing hardness in the water. This precipitate settles and restricts the outflow of the water from the test-chamber, the height of the liquid in which is thus a measure of the efficiency of the softening process. When the zeolite is exhausted, the liquid level in the test-chamber rises to such an extent that a float closes the circuit of an electric indicating apparatus.

E. S. KREIS.

Fumigant. G. H. BUCHANAN, Assr. to AMER. CYANAMID Co. (U.S.P. 1,586,175, 25.5.26. Appl., 19.1.25).—Hydrocyanic acid may not be capable of detection by its smell when it is present in the air in fatal quantities. To overcome this disadvantage it is mixed with 10—15% of cyanogen chloride, which is lachrymatory, and 2—4% of water for use as a fumigant.

E. S. KREIS.

Preparation of sterilising agents, germicides, and the like. C. H. H. HAROLD, Assec. of UNITED WATER SOFTENERS, LTD. (U.S.P. 1,590,372, 29.6.26. Appl., 2.1.26. Conv., 23.3.25).—Chlorine solution is added to an ammonium salt solution, the ratio of ammonium radical to chlorine being 0.25—2:1 by weight.

B. FULLMAN.

Purification of air [from ammonia] to render it suitable for breathing. G. ST. J. PERROTT and M. YABLICK (U.S.P. 1,586,327, 25.5.26. Appl., 31.10.25).—Finely-divided filling material is stirred into a hot concentrated solution of an organic or inorganic crystalline acid, so that the mass on cooling sets to a porous lumpy mass which will remove ammonia from the air. Boric acid is preferred. If the mass will not set of its own accord, a small quantity of hydraulic or oxychloride cement may be added.

E. S. KREIS.

Softening water. F. SCHMIDT (U.S.P. 1,590,913, 29.6.26. Appl., 21.10.25. Conv., 12.1.24).—See E.P. 227,429; B., 1926, 302.

Treatment of household and street waste. K. GERSON (U.S.P. 1,593,491, 20.7.26. Appl., 26.11.24. Conv., 6.5.24).—See E.P. 247,284; B., 1926, 390.

Means for withdrawing and delivering measured quantities of liquids, applicable for delivering quantities of reagent solutions in water-treating apparatus. R. H. FROUDE, W. V. BOBY, and W. BOBY & Co., LTD. (E.P. 254,499, 22.6.25).

Filtering apparatus [for water]. B. BRAMWELL (E.P. 254,764, 11.2. and 9.11.25).

Insecticide (U.S.P. 1,589,866).—See XVI.