BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JAN. 29 and FEB. 5, 1932.*

I.—GENERAL; PLANT; MACHINERY.

Spray drying by the Krause process. F. A. Oetken (Chem.-Ztg., 1931, 55, 901—902, 923—925).—The Krause spray dryer, which has found widespread use in Germany since the war, employs rotating discs for atomisation of the liquid. These are especially superior to jets for very small and very large outputs, and for viscous liquids. The disc is placed within an upright cylindrical chamber with bottom air or gas inlet. Variations in the general design and the drive are described. Cottrell precipitators are used when the solid material requires to be collected at a high temp. In some cases heat exchange is possible. Older types of spray dryers have a very low thermal efficiency, as the hot air etc. can leave only with a very low degree of saturation to H_2O vapour. A consumption of 3 pts. of steam for 1 pt. of H_2O evaporated was common. The efficiency of a dryer depends both on fineness of atomisation and pressure difference between the interior of a droplet of liquid and the hot gas. The Krause plant obtains improved thermal efficiency by reduced size of plant, and, if the material to be dried allows of it, the use of high temp. In a dryer working with milk, 0·93 kg. of steam was used per kg. of H_2O evaporated. The product is obtained as a uniform fine powder requiring no further treatment. Many large Krause dryers are used in the alkali and soap industries.

C. Irwin.

Free air cooling of hot gases in mains. J. A. Walters (J.S.C.I., 1931, 50, 439—444 t).—Heat losses from sheet Fe pipes of various sizes through which hot gases were flowing have been measured and correlated with various factors such as rate of gas flow, temp. of gases at inlet, and position of pipes. The results apply to windless external conditions. The effect of introducing inner pipes through which cold air might be blown has also been examined.

Viscosity determination.—See II. **Exothermic reactions.**—See VII.

See also A., Dec., 1372, **Measuring the velocities of gas reactions.** 1373, **Rate of dissolution of a granular solid.** 1387, **Determination of turbidity in liquids. Mixed-colour colorimeter.** 1388, **Apparatus for analytical control.**

Patents.

Rotary-hearth furnace. E. L. Smalley, Assr. to Hevi Duty Electric Co. (U.S.P. 1,806,027, 19.5.31. Appl., 10.7.30).—A furnace having a rotating annular hearth is provided with electric heaters in the hearth (in addition to fixed ones in the walls) which are switched on automatically at the correct time. B. M. Venables.

[Regenerative] furnace. G. and D. M. Naismith (Assee.) (U.S.P. 1,805,001, 12.5.31. Appl., 9.12.29).—Substantially only the air is regenerated, but a small auxiliary combustion space is formed in the regenerator and is provided with a separate supply of fuel.

B. M. Venables.

Regenerative reverberatory furnaces. O. Schweitzer, and Eisen- u. Stahlwerk Hoesch (B.P. 360,754, 27.1.31. Ger., 2.10.30. Addn. to B.P. 351,297; B., 1931, 825).—The inlet port of a furnace is formed in such a way that the air tends to slide along the roof rather than over the charge. The gas is admitted through jets inclined downwardly under a short arch across the rising stream of air, thus causing, on full heat, the flames to play on the bath; on a reduction of the full supply, *e.g.*, during charging, the air resumes its course along the roof with diminished oxidising effect. B. M. Venables.

[Tunnel] furnace. F. W. Brooke, Assr. to W. Swindell & Brothers (U.S.P. 1,807,147, 26.5.31. Appl., 9.6.28).—An electrically heated tunnel kiln in which the goods move in two lines in opposite directions is arranged so that the heaters can be removed while the furnace is in operation. The side heaters are situated in a widening of the kiln so that they can be removed longitudinally, and central heaters are provided between the two lines of goods, which can be removed by lowering them into a pit. B. M. Venables.

[Soaking-pit] furnace. F. J. Werner (U.S.P. 1,807,112, 26.5.31. Appl., 21.2.25).—The lid of the furnace runs on rails which are water-cooled and supported independently of the walls. B. M. Venables.

Coal-fired furnaces. Neepsend Steel & Tool Corp., Ltd., H. Sykes, and J. H. Jarvis (B.P. 361,689, 10.1.31).—A hearth where incomplete reducing combustion takes place is situated alongside a second hearth where the combustion is completed with the aid of additional air and steam, a recuperator being placed between the two. A by-pass is provided direct from the first hearth to the chimney for use when heating up etc. B. M. Venables.

Oil-burning furnaces. J. Howden & Co., Ltd., and W. H. Howden (B.P. 361,795, 2.4.31).—An oil valve of the screw-down type and a lever-operated air valve are interlocked so that the air valve must be opened first and closed last. B. M. Venables.

Furnace. J. F. O'Connor, Assr. to Doherty Research Co. (U.S.P. 1,805,634, 19.5.31. Appl., 26.2.21).—A boiler or other furnace adaptable to burn solid and/or gaseous fuel is described. The gas-burner nozzles are

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* The remainder of this set of Abstracts will appear in next week's issue.

constructed of SiC in order that coke-oven gas having a high rate of flame propagation may be used.
B. M. VENABLES.

Heat-treating furnace. R. A. DE VLIEG, Assr. to CHRYSLER CORP. (U.S.P. 1,805,360, 12.5.31. Appl., 8.9.28).—The articles are pushed through the furnace by masts extending up through a longitudinal slot in the hearth ; the masts are propelled by spiral-bladed shafts. B. M. VENABLES.

Gas-fired reheating furnace. C. F. PRIEST (B.P. 361,551, 24.10.30).—A furnace for reheating steel or other oxidisable material is constructed so that the combustion of fuel takes place in three stages. Primary combustion takes place between normal proportions of air and fuel in spaces above the inlet regenerators and below the hearth of the goods chamber, the secondary amount of fuel is then added and the reducing gases are passed over the goods, after which the secondary amount of air is added and the combustion completed in the spaces below the hearth and above the outlet regenerators. The regenerators are subdivided and the parts alternate with each other so that there is a certain amount of heat recuperation as well as regeneration by reversal. B. M. VENABLES.

Core oven. W. V. BAKER (U.S.P. 1,805,029, 12.5.31. Appl., 15.6.27).—A vertical core oven contains an ascending and descending column of carriers adapted to support the grids on which are placed the articles to be baked. Elevators are mounted beneath the columns and are operated to move up and down together. By automatic means the articles are moved in a continuous cycle up and down the furnace until baking is completed. A. B. MANNING.

Heat transmission and distribution. O. D. LUCAS (B.P. 360,816, 6.5. and 21.7.30).—Ph_2 or Ph_2O is used as a circulating heat-transmitting fluid at temp. up to 260° at atm. pressure and up to 530° at pressures up to 500 lb./sq. in. The fluid may be allowed to boil or not as desired. B. M. VENABLES.

Dehydrator. H. M. GRIFFOUL (U.S.P. 1,805,173, 12.5.31. Appl., 9.4.29).—The apparatus comprises an air-heating tunnel between two goods tunnels connected by a cross-passage in which are situated the circulating fans. B. M. VENABLES.

Circulation of fluids for drying materials. J. OGDEN (B.P. 360,477, 7.8.30).—Fans are provided to produce transverse circulation with minor progression in several stages in a single drying chamber.
B. M. VENABLES.

Thermostat. B. R. WINGFIELD (B.P. 361,604, 19.11.30).—A toothed wheel attached to a bi-metal helix operates a spring blade upon an extension of which are electrical contacts which move quickly in the later stages of their closing under the influence of permanent magnets. The magnets similarly delay the opening until the spring is flexed sufficiently to snap them open.
B. M. VENABLES.

Thermostatic device. F. T. LAMBERT (B.P. 361,475, 16.9.30).—An electric switch, gas tap, or other means of heat regulation is controlled by a device acting on the principle of the hour glass of which the size of the neck is regulated by a thermostat. B. M. VENABLES.

Reduction or elimination of scale deposits on the heating elements of water heaters. A. WRIGHT and H. J. OSBORN (B.P. 361,007, 23.8.30).—A heating vessel is described which is divided vertically into two unequal compartments, the smaller of which is in direct contact with the source of heat. A condensing arrangement placed above the water level of the larger compartment delivers condensed H_2O into the smaller one and thus causes the water therein to approach the quality of distilled H_2O, with consequent reduction in scale deposits. C. JEPSON.

De-superheating of steam. STANDARD OIL CO., Assees. of P. O. VANDEVEER (B.P. 361,395, 21.7.30. U.S., 2.8.29).—The superheated steam is passed through a number of U-tubes forming the heating element of a boiler which delivers saturated steam at a pressure not less than that of the superheated steam, so that the two flows can mix, such pressure being controlled by an automatic valve which therefore also determines the temp. of the combined flow. B. M. VENABLES.

Evaporator [for refrigerating systems]. C. E. L. LIPMAN, Assr. to LIPMAN PATENTS CORP. (U.S.P. 1,805,526, 19.5.31. Appl., 3.5.30).—An evaporator for use inside a refrigerating chamber is formed of three or four nested cups having their rims welded together. The liquid refrigerant is supplied to the inner jacket space so that the interior of the cup forms an ice-making chamber ; the refrigerant boils over into the outer jacket, the outer wall of which is provided with heat-collecting ribs. The middle jacket (if present) forms an insulating space. B. M. VENABLES.

Refrigeration. FRIGIDAIRE CORP., Assees. of T. MIDGLEY, JUN., A. L. HENNE, and R. R. MCNARY (B.P. 357,263, 24.6.30. U.S., 8.2.30).—Aliphatic hydrocarbons, preferably CH_4 and C_2H_6 or C_2H_4, carrying as substituents 2 or more F atoms, or at least 1 F atom and 1 or more Cl, Br, or I atoms, are liquefied and used as refrigerants. Examples are CF_2Cl_2, b.p. —25°, $CF_3\cdot CHFCl$, b.p. —10°, and $CF_3\cdot CFCl_2$ or $(CF_2Cl)_2$.
C. HOLLINS.

Refrigerant composition. W. A. KUENZLI, Assr. to SERVEL, INC. (U.S.P. 1,808,604, 2.6.31. Appl., 18.6.30).—The composition comprises MeCl and 0·05—5% of acraldehyde. L. A. COLES.

F.p.-lowering composition. A. N. ERICKSON (U.S.P. 1,804,463, 12.5.31. Appl., 7.11.25).—The compositions contain, *e.g.*, $NaNO_3$ and 1% of glue to prevent "creeping," or $Ca(NO_3)_2$ and 1% of $Na_2Cr_2O_7$ to inhibit corrosion. L. A. COLES.

Liquid to be used as heat-transferring medium [in heating and cooling installations]. W. S. SHERMAN, Assr. to GEN. FRIGHEATONE CO., INC. (U.S.P. 1,805,500, 19.5.31. Appl., 9.1.30).—The liquid comprises ethylene glycol, boiled linseed oil, a mutual solvent for these ($COMe_2$), and H_2O. L. A. COLES.

Production of snow for fire-extinguishing purposes. A. L. MOND. From I. G. FARBENIND. A.-G. (B.P. 360,757, 29.1.31).—Inclined jets cause liquid CO_2 mixed, if desired, with other suitable liquids, *e.g.*, CCl_4, to whirl tangentially inside a conical outlet piece.
B. M. VENABLES.

Production of foam [for fire extinguishing]. Pyrene Co., Ltd., and H. E. Bedford. From Minimax A.-G. (B.P. 361,435, 26.8.30).—A jet of water from a main sluices fire-extinguishing powder out of a container, and another jet operates an ejector which expels the mixture. B. M. Venables.

[Chimney] fire-extinguishing composition. W. L. Wedger and J. W. Edmands, Assrs. to Central Railway Signal Co., Inc. (U.S.P. 1,807,456, 26.5.31. Appl., 24.3.30).—A composition containing, *e.g.*,15·02% of $KClO_4$, 19·12% of S, 49·14% of Zn dust, 5·46% of NH_4Cl, 2·74% of $MgCO_3$, 1·70% of $K_2Cr_2O_7$, and 6·82% of wood pulp and paraffin is packed into cartridges suitable for burning at the base of the chimney. L. A. Coles.

Cooler contacting with circulating air. A. Lysholm and G. Cederstrand, Assrs. to Aktieb. Ljungströms Ångturbin (U.S.P. 1,805,917, 19.5.31 Appl., 2.8.28. Swed., 4.8.27).—A number of rows of flattened tubes have corrugated sheets wedged between, the ridges being transverse to the tubes. The outer layers of tubes and sheets are shallower than the interior ones. B. M. Venables.

Production of vacua. (A) H. J. West and (B) A. O. Jaeger and H. J. West, Assrs. to Selden Co. (U.S.P. 1,809,614 and 1,809,627, 9.6.31. Appl., [A] 27.12.30, [B] 28.3.31).—Liquids for use in high-vac. condensation pumps or as sealing media in low-vac. pumps comprise (A) Bu benzoyl- (or naphthoyl-)benzoate, or (B) a hexahydrophthalide. L. A. Coles.

Hammer mill. W. J. Clement, Assr. to Bossert Corp. (U.S.P. 1,807,197, 26.5.31. Appl., 5.6.28).—The material is fed to a disintegrator through the upper part of the circumferential casing, and is withdrawn through the lower part by a fan which is separate except that it is mounted on the same shaft. B. M. Venables.

Eccentric or draw-rods [pitmen] for stone crushers. F. Krupp Grusonwerk A.-G. (B.P. 360,747, 16.1.31. Ger., 7.2.30).—A pitman of a crusher is formed in such a way that its bearing may be removed without disturbing the shaft bearings or the flywheels. B. M. Venables.

Pulverising or disintegrating equipment. W. C. S. Graham (U.S.P. 1,806,249, 19.5.31. Appl., 23.2.29).—Balls or other heavy articles are continuously elevated and allowed to fall on the material. Air separation is provided. B. M. Venables.

Pulveriser. O. A. Kreutzberg (U.S.P. 1,806,980, 26.5.31. Appl., 5.11.26).—The pulveriser comprises a rotating table upon which rollers are pressed. The table comprises conical, vertical, and horizontal portions, and above it is situated an air-separator operated with horizontal whirling currents of air. B. M. Venables.

Grinding method and apparatus. G. H. Carnahan, Assr. to Rubber Surfacers, Inc. (U.S.P. 1,807,383, 26.5.31. Appl., 29.9.28).—A ball mill is charged with balls of resilient material, *e.g.*, rubber, which are made heavy either by incorporation of a large amount of litharge or by providing them with metallic cores; for the latter purpose an alloy of 90% Pb and 10% Sb is suitable. B. M. Venables.

Grinding and mixing pan. W. E. McMurray, Assr. to Clearfield Machine Co. (U.S.P. 1,806,077, 19.5.31. Appl., 10.10.28).—The mill has a rotating pan and edge runners, the axle for the latter being rigid; the rise and fall of the rollers is allowed for by mounting them on sleeves which are eccentrically and loosely mounted on the axle. Scraping devices are described. B. M. Venables.

Mixing, dissolving, or dispersing apparatus. K. S. Valentine, Assr. to Turbo-Mixer Corp. (U.S.P. 1,804,966, 12.5.31. Appl., 4.4.29).—A mixer of the turbine-blade type is provided with a number of small auxiliary blades on the edges and faces of the main blades. B. M. Venables.

Apparatus for dissolving solids. G. A. Walter (U.S.P. 1,807,263, 26.5.31. Appl., 1.12.28).—The solvent is supplied upwards from the bottom of a conical tank, underneath a baffle which spreads the stream with the object of keeping the whole of the comminuted solid matter in suspension. B. M. Venables.

Introduction and withdrawal of solid substances into and out of vessels containing a medium under high pressure. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 360,943, 7.8.30).—The solid is passed through a series of chambers separated by valves of which the odd numbers are operated in unison alternately with the even numbers in unison. Forms of flexible valves are described. The gaseous medium present in the chambers may be sent back to the high-pressure end by pumps, and may be different from that in the main vessel into which the solids are to be delivered. B. M. Venables.

Wet-separating tanks. H. J. Rake (B.P. 361,477, 17.9.30).—In a collecting tank for fine coal the inlet conduit and both runs of the conveyor, *i.e.*, all elements creating a disturbance, are surrounded by a baffle. B. M. Venables.

Gas-, air-, and/or liquid-heating apparatus. Gas Light & Coke Co., J. G. Clark, C. A. Masterman, and T. G. Noble (B.P. 360,893 and 361,329, 6.8.30).—(A) The flow of products of combustion through a geyser or similar apparatus is firstly through the main heating compartment, secondly through a passage one wall of which is cooled by the incoming fluid to be heated, and thirdly along the other side of the other wall of the second passage. Moisture is condensed in the second flow and latent heat recovered; in the third flow the gases are reheated to a sufficient extent to provide a natural draught. (B) Forms of baffle for use in the main heating compartment are described. B. M. Venables.

Apparatus for heating liquids. R. Morton & Co., Ltd., and P. Robinson (B.P. 361,675, 29.12.30).—A heating device comprising a bundle of steam-tubes in the lower part of a vessel is provided with a hood which can be raised to different levels to suit different quantities of liquid. B. M. Venables.

Rotary extractor [for fats, oils, etc.]. O. H. Wurster and A. M. Smith, Assrs. to Wurster & Sanger, Inc. (U.S.P. 1,807,232, 26.5.31. Appl., 13.9.28).—In a digester comprising a rotating cylinder provided with a filter diaphragm, the passages for the various fluids are formed in the material of one or both trunnions. B. M. Venables.

Centrifugal separators. Aktieb. Separator (B.P. 361,754, 2.3.31. Swed., 8.11.30).—An oil-tight joint between the fixed feed-pipe and rotating separator is described, for use when it is desired to prevent entrainment of air, *e.g.*, in the purification of transformer oil. B. M. Venables.

Centrifugal separator. F. Dupuis (U.S.P. 1,806,241, 19.5.31. Appl., 6.3.30. Belg., 9.3.29).—A centrifuge having an imperforate cylindrical wall and helical rakes to remove collected solid matter is described. B. M. Venables.

Filters or strainers. A. Hoare (B.P. 361,681, 31.12.30).—A filter comprising a rotatable pack of plates interleaved with fixed scraping plates is arranged with longitudinal slots formed in the cylindrical filtering surface into which the edges of the scraper blades emerge when the pack is rotated. B. M. Venables.

Filtering and apparatus [diaphragm] therefor. S. P. Kramer (U.S.P. 1,806,471, 19.5.31. Appl., 24.2.28). —A filter diaphragm is formed from MgO calcined at 1300°, mixed with silicious material, and fired at 900° without permitting any substantial combination of the acid and basic constituents. The filter is effective in retaining bacilli, dyes, etc. that would pass either material separately. B. M. Venables.

Fluid pressure discharge for continuous filters. J. T. Hoyt, Assr. to Oliver United Filters, Inc. (U.S.P. 1,804,934, 12.5.31. Appl., 9.9.27).—External jets of fluid are used to discharge cake from a drum or leaf filter. B. M. Venables.

Acid-proof sedimentation apparatus. W. W. Triggs. From Dorr Co. (B.P. 361,680, 30.12.30).—The submerged part of a thickener mechanism is constructed in such a way as to facilitate covering with non-corrosive material. B. M. Venables.

Apparatus for desludging liquids. H. H. Cannon, Assr. to Cannon-Prutzman Treating Processes, Ltd. (U.S.P. 1,804,743, 12.5.31. Appl., 16.2.29).—The liquid is caused to flow between a number of closely spaced superposed trays, whereby separation takes place because the solid matter has only a short distance to settle out of the streams having laminar flow. B. M. Venables.

Distillation. O. Behimer, Assr. to Texas Co. (U.S.P. 1,806,732, 26.5.31. Appl., 10.2.28).—In a system for producing several fractions of, *e.g.*, oil, the ingoing liquid is passed in indirect heat exchange with (in order) the final vapour, the cooler fractionating tower, the hotter fractionating tower, and the residuum, before entering the heating coil and/or the still. In the above circuit, adjacent the towers are trap chambers from which any vapour separated in them enters the corresponding tower at an intermediate point. B. M. Venables.

Vacuum distillation. W. B. Logan, Assr. to Texas Co. (U.S.P. 1,804,941, 12.5.31. Appl., 27.12.27).—In the production of lubricating oil, a still and tower are operated at a pressure of 25—50 mm. Oil vapours produced in the still, with or without the aid of steam, are introduced into the lower part of a tower and water to the top in such quantity that it is practically all converted into steam by partial condensation of the oil. The desired lubricating fraction is withdrawn as condensate from the bottom of the still. B. M. Venables.

Apparatus for carrying out distillations. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 360,817, 6.5.30).—A liquid containing a number of constituents, *e.g.*, hydrocarbon oils, is heated to about the mean b.p. of the distillate required and introduced into a column at an intermediate point; the unvaporised bottom flow is caused to trickle over heated surfaces and the vapours therefrom are passed into the lower part of the column. The original liquid may be preheated by the vapours from the top of the column and may be admitted to the column under slight pressure. B. M. Venables.

Carrying out reactions under high pressures. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 360,424, 4.6.30).—A process is described which is especially suitable for the preparation of petrol from middle oil and H_2. The two constituents under a pressure of 200 atm. are passed through a heat recuperator, a heater, and then, at 480°, through a catalyst chamber. The products after reaction are cooled in the recuperator to 200° and the bulk of the petrol vapour and residual H_2 is separated without reduction of pressure and, later, from each other by further condensation. A certain amount of the first condensate is sprayed into a tower with reduction of pressure to 1 atm., further petrol vapour and residual middle oil being obtained. B. M. Venables.

Manufacture of cementitious materials [catalysts]. Brit. Celanese, Ltd., H. F. Oxley, W. H. Groombridge, and E. B. Thomas (B.P. 355,362, 16.4.30. Cf. B.P. 353,467; B., 1931, 1132).—Catalysts for use, *e.g.*, in the prior process, are prepared by the setting with H_2O of a mixture of an alkaline-earth (Ca) oxide or MgO and ZnO, prepared by heating at 1200—1800° (preferably 1400—1600°) mixtures of compounds yielding the oxides. L. A. Coles.

Reflux tower. J. Primrose, Assr. to Foster Wheeler Corp. (U.S.P. 1,805,635, 19.5.31. Appl., 6.11.24).—Means for withdrawing liquid from each pool are provided. B. M. Venables.

Dephlegmators. J. de L. Seguy, Assr. to Universal Oil Products Co. (U.S.P. 1,806,089 and 1,806,090, 19.5.31. Appl., [a] 21.6.26, [b] 9.12.26).—Towers in which the downflow pipes for liquid are situated immediately above the upflow pipes for vapour are described. These pipes are capped and the caps are provided with rims on the top forming small reservoirs, from which the liquid, in (a), passes through perforations in the tops of the caps so that the vapours pass through falling drops inside the caps, or, in (b), falls down the outside of the caps so that the vapour passes through curtains of the liquid. B. M. Venables.

[Colorimetrically] determining the strength of solutions. C. Kocour (U.S.P. 1,806,806, 26.5.31. Appl., 1.5.26).—A vial containing an assay solution of a coloured salt, *e.g.*, of nickel, as used for electroplating purposes, is placed in line with a similar vial containing a liquid coloured in such a way, *e.g.*, red, as to neutralise the green of the nickel. Also a set of standard vials are made up in two series, one containing integral amounts of Ni, *e.g.*, from 1 to 8 oz. Ni per gal., and the other series containing fractional amounts; further, each standard vial contains exactly half the red colour of the neutralising vial. The vials are viewed two pairs at a time through holes in a wooden block. B. M. Venables.

Mixing of gases and liquids, or mixing liquids in chemical reactions or processes. W. Mueller (B.P. 361,639, 5.12.30).—Part of the gas (or one of the gases) is emitted in a horizontal direction centrally under the liquid, and the other part rises through the liquid in the form of a ring of bubbles. B. M. Venables.

Apparatus for removing dust from gases. N. L. Snow (B.P. 360,366, 1.8.30).—Various forms of baffle for use in an apparatus of the irrigated surface type are described. B. M. Venables.

Separation of dust from the waste gases of furnaces or kilns. A. Andreas (B.P. 360,547, 1.9.30. Ger., 2.9.29).—Devices are placed in a flue between the feeder and the mouth of a rotary or other kiln by which the raw material is kept in motion in a state permeable to the flue gases. B. M. Venables.

Washing of flue gases from combustion furnaces etc. H. J. Hodsman and A. Taylor (B.P. 360,574, 20.9.30).—Flue gases containing SO_2 and free O_2 are scrubbed with dil. aq. NH_3 in concurrent flow and with a time of contact of about 1 sec. The free O_2 is effective in oxidising most of the sulphite and also any sulphides derived from the NH_3 liquor; the oxidation may be completed in a separate vessel by means of electrolysis or by additional air in the presence of a catalyst (*e.g.*, a ferrous salt) under the conditions of faint acidity and temp. below 40°. The $(NH_4)_2SO_4$ may be allowed to accumulate until crystallisation is economic.

B. M. Venables.

Devices for separating liquids from gases and vapours. P. Ibach (B.P. 360,971, 14.8.30).—A moisture eliminator for the steam outlet of a boiler is described.

B. M. Venables.

Gas dryer. F. Wille, Assr. to H. A. Brassert & Co. (U.S.P. 1,806,989, 26.5.31. Appl., 5.1.29).—Moisture is eliminated from a gas (*e.g.*, blast-furnace gas) by filtering means which are arranged in two passages in parallel. Either can be cut out of circuit for cleaning by the filling of water-seals. B. M. Venables.

Process of fractionating, cooling, and condensing gas mixtures. F. Pollitzer (U.S.P. 1,804,432, 12.5.31. Appl., 10.5.24. Ger., 31.5.23).—In a process involving cooling of gases below the f.p. of a constituent, the latter is prevented from freezing by the addition of a substance that is liquid at the temp. desired and acts as a solvent for the constituent; *e.g.*, hydrocarbons liquefied by pressure may be used to remove CO_2 from coke-oven gas and re-used after separation of the CO_2 by allowing the pressure to fall and the temp. to rise.

B. M. Venables.

Devices for storing liquefied or strongly compressed gas. O. M. Seemann and A. Cohn (B.P. 361,312, 12.7.30).—The bottle is enclosed in a casing, able to resist moderate pressures, in which is a pointed screw for piercing the cap of the bottle. The cap has two plies, the outer one having a permanent tapered hole to fit the pointed screw and serving as a regulating valve, and the inner being of softer material which forms a gasket until pierced by the screw. A vent hole, which is uncovered by partial removal of the cap, is provided to prevent accidents should any pressure remain when it is desired to remove the cap.

B. M. Venables.

Doors of furnaces, ovens, or the like. Gibbons Brothers, Ltd., and M. van Marle (B.P. 362,228, 4.2.31).

Apparatus for heating or cooling air or other gases. T. Lewis (B.P. 360,559, 5.9.30).

Spent fuller's earth. Revivifying clays etc. Generating power.—See II. **Rotary kilns.**—See IX. **Dust pptn. from gases.**—See XI. **Filter for smoke etc. Boiler water.**—See XXIII.

II.—FUEL; GAS; TAR; MINERAL OILS.

Determination of heat of combustion and calorific value of coal. F. Moravec (Chem. Listy, 1931, 25, 450—453).—A description of standard methods.

R. Truszkowski.

Distillation of coal under pressure and in presence of hydrogen. H. Leroux (Trans. II World Power Conf., 1930, 6, 407—431).—Increased pressure decreased gas production, but increased calorific val. owing to increase in CH_4. Higher temp. increased gas production, CO, and H_2, but decreased the calorific val., CO_2, CH_4, and C_nH_m. The amount and quality of the tar were but slightly affected by pressure and H_2. The yield of NH_3 increased considerably with temp. and pressure, particularly in presence of H_2.

Chemical Abstracts.

Phenols of tar from Don basin coal. N. Naruishkin, K. Gradski, and M. Gradskaya (J. Chem. Ind., Russia, 1930, 7, 476—484).—The distribution of phenols in the fractions has been studied. Of the total phenols the fraction b.p. 150—205° contained 23—57%, and that b.p. 205—260° 41—75%. The % of phenols is not related to the sp. gr. of the oil.

Chemical Abstracts.

Pyrogenic decomposition of paraffin oil of primary tar from Chelyabinsk coal. I. Y. Postovski and B. P. Lugovkin (J. Chem. Ind., Russia, 1929, 6, 1498—1500).—Hydrogenation did not increase the yield of liquid fuel. Vapour-phase cracking gave the best results. Chemical Abstracts.

Preparation of hydrocarbons from phenolic tars. C. Padovani and E. de Bartholomaeis (Atti III Cong. Naz. Chim. pura appl., 1929, 792—819; Chem. Zentr., 1931, i, 3632).—The phenolic fraction, b.p. 200—300°, of Valdarno brown-coal tar was reduced with H_2 and nascent H from steam in presence of Fe at 750—800°. Half of the dephenolated oil (36%) consisted of C_6H_6. It is presumed that fission and hydrogenation occur, but no direct reduction takes place.

A. A. Eldridge.

Determination of the viscosity of tar, pitch, and similar opaque substances. D. C. Broome and A. R. Thomas (J.S.C.I., 1931, 50, 424—428 T).—Disadvantages in the use of the normal types of industrial viscosimeter for tars, bitumen, etc. are discussed. To overcome these, and to give results directly in absolute units, the "falling-sphere" method is recommended. Details are given of an apparatus in which the fall of a steel ball is "observed" by noting the alterations in inductance and capacity of a closed oscillatory circuit, of extremely high natural frequency of oscillation, by the passage of the ball through two "search coils" in the circuit, and suspended at suitable positions in the fluid. Audible indication of the presence of these oscillations is obtained by loosely coupling the circuit to a similar circuit tuned to produce audible beats in a telephone. Spheres ranging in diameter from $\frac{1}{16}$ in. to $\frac{1}{2}$ in. may be used in this apparatus, and tests may be carried out at any convenient temp. Tars and bitumens do not always behave as true liquids, but they possess a "crit. transitional temp. range" over which changes of state of the materials take place.

Determination of the tar value by the Hungarian M.A.V. method, and its dependence on the experimental conditions. I. K. Figlmüller (Petroleum, 1931, 27, 839—842).—The sp. gr. of the solvent, purity of the H_2SO_4 used, temp., time taken to settle out, and the amount of H_2O added are factors which influence the pptn. of the tar. Temp. and time of distilling, disintegration processes, and chemical influences play their part during the formation of tar, and affect the resultant tar val. both of the crude oils and their distillation residues. E. Doctor.

Iodine value of natural and petroleum asphalts. H. Pöll (Petroleum, 1931, 27, 817—826).—A new method—combining McIlhiney's (B., 1900, 176) and the modified Wijs method (Pummerer and Mann, A., 1929, 1455)—is used to determine the I val. by employing Br and distilling off the excess of Br and HBr. In this manner addition or substitution of halogens is separately determined in asphalts; results show that no aliphatic double linkings are present. This is probably the case in all natural asphalts and paraffins. E. Doctor.

Pyrolysis of high-molecular compounds and cracking of heavy petroleum fractions under hydrogen pressure. V. N. Ipatiev (J. Chem. Ind., Russia, 1929, 6, 1563—1570).—A discussion.

Chemical Abstracts.

Yield of lubricating oil from an Esthonian crude shale oil. J. Hüsse (Technika Ajakiri, 1930, 9, 183—186; Chem. Zentr., 1931, i, 3310).—A fraction (25—30%) obtained by vac. distillation is compared with paraffin-base lubricating oils. A. A. Eldridge.

[Oil]cracking unit. Anon. (Azerbaid. Neft. Choz., 1931, No. 4, 127).—A Baku unit is described.

Chemical Abstracts.

Luminescence analysis in the petroleum industry. F. Dangl (Petroleum, 1931, 27, Motorenbetr., 2—6).—Introductory. A general survey of fluorescence and luminescence phenomena is given, and various methods of producing ultra-violet rays are described.

E. Doctor.

Manufacture of asphalt from cracking-process residues. F. M. H. Taylor (Inst. Chem. Eng., Dec., 1931, 16 pp.).—From the results obtained with a 5-gal. still it was possible to design a small commercial unit for the production of marketable asphalt. The air-refining process was chosen in preference to the use of steam as it gives a higher yield, the end-point is more easily controlled, and the heat generated by the oxidation of the oil is usually sufficient to maintain the reaction temp. The initial results had shown that the agitator type of reaction vessel gives a reduction of time of reaction or increased throughput for a given size of plant, low air and fuel consumption, avoidance of local overheating, more complete oxidation and polymerisation of light oils before their removal by distillation, and more complete usage of air. The use of a tower for the reaction with a suitably designed air spray was found to give sufficiently good contact for commercial operation. A flow chart of the plant and diagram of the lay-out are given with details of the practical results obtained.

H. S. Garlick.

Coking of Lisichanski coal. E. Bauman (J. Chem. Ind., Russia, 1931, 8, 597—606).

Coumarone.—See III. **Exothermic reactions. $(NH_4)_2SO_4$.**—See VII. **Firing of enamels.**—See VIII.

See also A., Dec., 1371, **Flame movement through explosive mixtures. Oxidation of fuel vapours in air.** 1372, **Measuring the velocities of gas reactions.** 1376, **CH_4 from CO and H_2.** 1377, **Catalytic conversion of CH_4.** 1391, **Determining traces of CH_4.** 1393, **Thermal decomp. of mercaptans.** 1396, **Constituents of petroleum.**

Patents.

Cleaning of coal. Dust-collecting system for coal cleaners. R. W. Arms, Assr. to Roberts & Schaefer Co. (U.S.P. 1,806,779—80, 26.5.31. Appl., [a, b] 23.5.27, [b] 10.3.28).—(a) A high-pressure stream of air is forced through a flowing bed of coal; the air includes a portion of the dust-laden air withdrawn from above the bed and recirculated together with an additional supply of air. A part of the dust-laden air is withdrawn from the system and passed to a dust separator. (b) A pneumatic stratifying table has a hood overlying its entire working area, and means for withdrawing air from the hood and recirculating it through the table. Means are also provided for withdrawing separately that portion of the spent air containing the highest proportion of dust and passing it to a dust separator. Some or all of the air to replace that withdrawn from the system is drawn in between the hood and the deck of the table. A. B. Manning.

Coke oven. J. van Ackeren, Assr. to Koppers Co. (U.S.P. 1,806,134, 19.5.31. Appl., 21.6.26).—The oven chambers are heated by means of water-gas produced in the chambers themselves by passing steam through the incandescent coke in the lower part of each chamber, the water-gas being withdrawn through a suitably placed outlet. A part of the water-gas may be allowed to ascend and mix with the distillation gases evolved in the upper part of the chamber in order to produce a gas of calorific val. suitable for public supply etc. The heating walls have vertical flame flues arranged in upper and lower flue sections so that regulated heat can be applied to the upper portions of the coking chambers for coal-gas production and to the lower portions for water-gas production. A. B. Manning.

Cooling of coking retorts. J. van Ackeren, Assr. to Koppers Co. (U.S.P. 1,807,019, 26.5.31. Appl., 12.1.25).—Steam is introduced into the coke-extractor magazine of a continuous, vertical coking retort, or similar carbonising apparatus, in such a manner as to cool the coke with the production of water-gas. The water-gas required to dil. the distillation gases to the desired degree, *e.g.*, to a calorific val. suitable for public supply, is permitted to ascend into the retort, while the excess steam and the remainder of the water-gas are withdrawn at a point above the coke-discharge holder, are passed through a waste-heat boiler, and are then returned by a fan to the coke-extractor magazine.
A. B. Manning.

Coking of liquefiable carbonaceous materials. E. W. Clarke and J. L. Eigenbrot, Assrs. to Amer. Tar Products Co. (U.S.P. 1,806,146, 19.5.31. Appl., 6.10.21).—An apparatus for coking pitch etc. comprises a gas generator, a long narrow combustion chamber in which the gas from the generator is burned with air preheated in recuperators, flues extending along the opposite sides of the combustion chamber and connected therewith, a heating chamber above the combustion chamber into which pass the products of combustion from the flues, and a metal coking retort supported in the heating chamber. The waste gases pass through the outflow passages of the recuperators. Means are provided for preventing access of air into the heating chamber so that the metal of the retort comes into contact only with a reducing atm.
A. B. Manning.

Production of volatilisable products from coal and oil and of gas by heat-treatment of carbonaceous materials. C. J. Greenstreet (B.P. 360,404, 29.4.30).—Finely-divided carbonaceous material is mixed with a petroleum oil and with steam or other vapour or gas, and passed through a long pipe (*e.g.*, 500 ft.) of relatively small diam. (*e.g.*, 2 in.), heated to a suitable temp. *e.g.*, 600° or above, according to the type of products required. The process is preferably carried out under a back-pressure of 75—100 lb./sq. in.
A. B. Manning.

Enriching gas. E. A. Dieterle (U.S.P. 1,804,402, 12.5.31. Appl., 19.1.24).—The gas and a vaporised enriching oil are passed through a carburetting chamber which contains tubes of bare heat-resisting metal through which are passed the highly heated products from a combustion chamber. Two or more water-gas generators may be so arranged that the blast gases from one are supplied to the combustion chamber while the water-gas from another is being carburetted.
A. B. Manning.

Treatment of combustible gas. A. C. Becker and W. Bertelsmann (B.P. 360,448, 1.7.30. Ger., 15.8.29. Addn. to B.P. 335,228; B., 1931, 10).—The additional constituents (H_2, CO_2, and/or N_2) required to restore the gas to the desired sp. gr., speed of ignition, and heating val. are derived from the original gas itself. The process may be applied to water-gas or other low-grade gas containing the same main constituents. A. B. Manning.

Decomposition [by compression and cooling] of coking gases and similar gas mixtures. Ges. f. Linde's Eismaschinen A.-G. (B.P. 360,487, 8.8.30. Ger., 9.8.29).—The gases are passed under pressure through periodically-changed cold regenerators, in which the constituents which separate out in the solid form on cooling (H_2O, CO_2, etc.) are deposited, and the precooled gas is then passed to the countercurrent coolers and therein separated into its constituents, *e.g.*, by successive liquefaction of the CH_4 and CO. The fresh gas and the cold-separated gases are passed alternately through the regenerators in such a manner that the deposited solid constituents are carried away again by part of the cooled separated gases. The constituents which it is desired to recover without contamination with H_2O, CO_2, etc. may be utilised for cooling the regenerators indirectly by passing them through pipes arranged therein. A. B. Manning.

[Filter] apparatus for cleaning [fuel] gas. T. M. Foulk, Assr. to Public Service Co. of Colorado (U.S.P. 1,807,521, 26.5.31. Appl., 12.7.24).—A filter is composed of alternate layers of metallic wool and cotton wool.
B. M. Venables.

Shale retort. C. O. White (U.S.P. 1,799,268, 7.4.31. Appl., 23.1.28).—The inclined retort consists of stepped sections with baffles suspended from the top near the upper end of each section to retard the fall of shale through the retort. Each section has a lateral gas-outlet pipe fitted with a chamber with a baffle around which the gas flows, thereby depositing dust which falls into an inclined conduit; the latter is situated in the retort furnace so that the dust is distilled.
D. K. Moore.

Natural gas conversion process. M. P. Youker (U.S.P. 1,800,586, 14.4.31. Appl., 1.5.25).—The compressed gas ($>$ 500 lb./sq. in.) is continuously fed through a heating zone maintained above 400° and kept under such conditions until a portion of the gas is converted into liquid hydrocarbons. The resultant mixture is separated into gasoline (withdrawn from the process), fixed gas (released), and hydrocarbon vapours (recycled with fresh hydrocarbon gas). H. S. Garlick.

Manufacture of oil gas. F. J. Nolan (U.S.P. 1,796,299, 17.3.31. Appl., 23.7.28).—Hydrocarbon vapours and steam are conducted through a heating zone wherein conversion takes place. The resulting vapours are alternatively compressed and expanded past a number of baffles each of which carries a catalyst composed of an alloy of 50% Al, 15% Ni, 10% Cu, 10% Ti, 2% Ag, 10% Mg, and 3% Bi, to which is added a small percentage of $K_2Cr_2O_7$ and Si, at temp. increasing from 760° to 870°. The vapours and gas are finally conducted to a zone heated to approx. 1093° for fixation.
H. S. Garlick.

Recovery of gasoline [from gases]. F. E. Hosmer (U.S.P. 1,796,755, 17.3.31. Appl., 16.6.26).—In the direct production of marketable gasoline from natural gas, casinghead gas, etc., the precooled gas under line pressure is refrigerated by evaporation of light oils thereinto, thereby condensing heavier oils, which are collected and removed; the exit gas is passed in heat-exchange relation into the incoming gas to effect precooling. Part at least of the gas so used is placed under sufficient pressure to condense light hydrocarbons, the remaining gas being passed to residue. The compressed gas is cooled and passed in heat-exchange relation with another part of the refrigerated exit gas. The light hydrocarbons are returned to serve in refrigerating the precooled gas. H. S. Garlick.

Hydrocarbon-oil conversion. C. P. Dubbs, Assr. to Universal Oil Products Co. (U.S.P. 1,799,218, 7.4.31. Appl., 30.7.27).—Fresh untreated oil is introduced into one end of a series of externally unheated zones each of which is maintained at a progressively higher pressure than that of the preceding zone. The unvaporised oil is removed from the last of the zones of the series and subjected to cracking conditions, sufficient heat for the process being supplied to the oil from an outside source. The heavier constituents are removed from the products of conversion and the remaining heated products of conversion are introduced to the zone of the series from which the unvaporised oil is taken off, thus causing the vapours released from the oil to move through the series of zones countercurrent to the movement of the untreated oil, thereby effecting a physical commingling of the vapours and oil in each of the zones. Vapours escaping condensation are removed from the zone of the series to which fresh oil is supplied, subjected to final condensation, and the resultant distillate is collected as the ultimate product. H. S. Garlick.

Apparatus for cracking of oils. R. T. Pollock, Assr. to Universal Oil Products Co. (U.S.P. 1,804,028, 5.5.31. Appl., 14.3.21. Renewed 5.2.27).—The vapours from the reaction chamber of a cracking apparatus are passed to the dephlegmator through a downwardly inclined vapour line in which is a continuous helical baffle having openings for the passage of condensate. H. S. Garlick.

Apparatus for cracking of oil. G. Egloff and H. P. Benner, Assrs. to Universal Oil Products Co. (U.S.P. 1,805,614, 19.5.31. Appl., 28.3.21. Renewed 21.2.29).—The cooling down of the expansion chamber prior to cleaning is expedited by pumping through it the cold raw oil. D. K. Moore.

Apparatus for producing low-b.p. hydrocarbons. C. P. Dubbs, Assr. to Universal Oil Products Co. (U.S.P. 1,799,413, 7.4.31. Appl., 11.3.18. Renewed 20.5.24).—Oil is heated in a coil of horizontal tubes and passed into the upper ends of inclined distilling tubes of larger diam., and thence into tanks in which C separates and the oil is recycled. The vapours taken from the upper end of the distilling tubes and any that may come from the settling tanks are air-cooled, the condensate passing into the tanks and thereby thinning the oil and facilitating the separation of C; the remaining vapours on water-cooling yield low-boiling hydrocarbons. The process may be operated at 280—540° and 50—500 lb. per sq. in. D. K. Moore.

Apparatus for treating hydrocarbon oils. E. E. Stewart (U.S.P. 1,798,338, 31.3.31. Appl., 6.11.26).—Crude oil is pumped through a primary still to the upper portion of a bell-cap vaporising tower, down which it flows countercurrent to the vapours from the cracking plant. The unvaporised oil is passed to a separator and thence to the cracking coil, from which it enters a cracking vessel where coke may be deposited. Pressure on the oil is then released, further vapour-phase cracking taking place. The vapours pass through a separator to the lower portion of the vaporising tower, in which they come in contact with the preheated crude oil. The apparatus is arranged so that straight-run and cracked gasoline may be collected separately or together as desired. T. A. Smith.

Cracking process [for liquid hydrocarbons]. W. P. Deppé and L. L. Summers (U.S.P. 1,804,917, 12.5.31. Appl., 8.2.24).—The cracking vessel consists of a column divided into a number of sections by means of traps which allow liquid, but not vapour, to pass through. In each section is a nest of heating pipes. The vapour from each section is carried by an external pipe to the next lower section, in which it passes upward through the bank of tubes. The oil flows downward through the trap and is cracked as a film on the tubes in contact with the vapours from the preceding section. Into the top section vapours are introduced from an external source. D. K. Moore.

Cracking of mineral oils. H. Blau (B.P. 360,513, 15.8.30).—The oil vapours are passed upward through the annular spaces formed by one tube inside another in a bank of tubes, and down through the inner tubes, depositing pitch in a vapour-collecting chamber, and then to a tower down which raw oil flows, dissolving pitch and cooling the vapours. The oil dissolves the pitch deposited in the vapour-collecting chamber on its way to the vaporiser. D. K. Moore.

Cracking of petroleum. G. Egloff, Assr. to Universal Oil Products Co. (U.S.P. 1,803,963, 5.5.31. Appl., 21.12.25).—Charging oil is subjected to given cracking conditions of temp. and pressure and permitted to undergo conversion in an enlarged zone. The vapours evolved are dephlegmated, thereby forming a substantial amount of reflux condensate. The unvaporised oil from the initial cracking and the reflux condensate are separately and independently subjected to further cracking conditions, and allowed to accumulate in separate zones; the vapours are condensed, and the reflux condensate is added to the initial condensate, for further treatment thereof. H. S. Garlick.

Cracking of hydrocarbons. G. H. Taber, jun., Assr. to Sinclair Refining Co. (U.S.P. 1,805,113, 12.5.31. Appl., 11.10.28. Cf. U.S.P. 1,663,868; B., 1928, 358).—The uncondensed vapours leaving the condenser are scrubbed with cracking stock in two towers. The liquid from the first passes to the reflux tower attached to the still, whilst that from the second passes to the heating tubes. D. K. Moore.

Treatment [continuous cracking] of hydrocarbon oils. W. K. Holmes, Assr. to Texas Co. (U.S.P. 1,804,933, 12.5.31. Appl., 31.8.25).—Cracking processes may be rendered continuous by periodically flushing the still with hot feed oil and simultaneously increasing the withdrawal of tar, at such times as the increase of density of the tar shows the presence of a large quantity of substances that readily form deposits of C. D. K. Moore.

Conversion of hydrocarbon oils. C. P. Dubbs, Assr. to Universal Oil Products Co. (U.S.P. 1,803,962, 5.5.31. Appl., 1.6.25).—Fresh charging oil is introduced into the top of a dephlegmator and sprayed over comminuted material. The charging oil and reflux condensate separated from the vapours are collected and pumped slowly through cracking tubes mounted between headers, and positioned in a furnace heated by a gas burner. The oil is raised to cracking temp. and directed into a vapour-reaction chamber where further reaction takes place, resulting in the release of vapours and a simultaneous accumulation of a small quantity of liquid residue. The oil vapours pass to the dephlegmator and the uncondensed vapours are passed to a water condenser. H. S. Garlick.

Hydrocarbon oil treatment. J. B. Heid, Assr. to Universal Oil Products Co. (U.S.P. 1,799,231, 7.4.31. Appl., 25.4.27).—Hot hydrocarbon oil under pressure, *e.g.*, that obtained in cracking processes, is introduced into a tower through a perforated coil and flows down over plates with circumferential and central openings alternately. There is a central shaft through the plates consisting of a number of pipes each of greater diam. than that of the one below, and each joining a plate with circumferential opening to the next similar plate above. There is an annular opening at the place where each pipe extends for a short distance into the one above, and this by an injector action carries away the vapours formed by the sudden reduction in pressure on the oil. D. K. Moore.

Treatment of petroleum oils. C. B. Watson, Assr. to Gyro Process Co. (U.S.P. 1,797,305, 24.3.31. Appl., 21.8.28).—Crude oil containing gasoline is passed through a heating coil placed in the conversion vessel of a vapour-phase cracking plant. The heated oil is then passed to a separator, where gasoline vapours are removed, and the residue is returned to the conversion chamber, where it is brought into direct contact with the gases from the cracking tube. Unvaporised oil from the conversion chamber is passed through a preheater to an evaporator, the vapours from which are passed to the cracking tube. T. A. Smith.

Distillation of hydrocarbons. I. C. Carpenter and A. R. Moorman, Assrs. to Contact Filtration Co. (U.S.P. 1,797,715, 24.3.31. Appl., 17.9.26).—Oil containing H_2O and corrosive materials (*e.g.*, salts) must be freed from the H_2O before it can be heated in a pipestill without risk of scale formation. The oil is therefore first discharged into a vessel containing hot oil, whereby all H_2O and some light fractions are removed. It is then pumped through a heating coil to a separator in which all light fractions are removed, and the residue is used in conjunction with a float-controlled valve to maintain the level of hot oil in the first vessel; excess residue is removed to storage. T. A. Smith.

Apparatus for stabilisation, rectification, and fractional distillation of natural gasoline. F. S. Woidich (U.S.P. 1,803,581, 5.5.31. Appl., 6.11.24).—The apparatus includes a system for storing natural gasoline at different pressures, a thermo-siphon heater having a rectifying column (*A*) above it with means including a mixing head connected to *A* at the base for conducting fluids through the heater from and to the bottom of *A*. An expansion chamber (*B*) close to *A* is connected to the top thereof, and means are provided for conducting gasolines from storage to the bottom of *B* to mix and expand therein. Mounted on top of *B* is a refrigerating chamber (*C*). Flues extending through *B* conduct gases and vapours to the top of *C* from *A* to heat the expanded gasolines. A separator is connected to the bottom of *A* with a pipe leading from the top to a naphtha-blending tower (*D*) having means for heating and feeding a fluid to the top thereof. A valve-controlled fluid-conducting and -cooling means, including a compressor, connects the bottom of *D* with a storage tank. Valve-controlled piping connects the bottom of the separator to *A* at different heights and to the top. H. S. Garlick.

Oil-fractionation [tower]. Foster Wheeler, Ltd. From Foster Wheeler Corp. (B.P. 360,242, 12.12.30).—In a tower from different trays of which oil is withdrawn, the velocity of flow of the liquid over the trays is kept nearly const. by baffles on each tray directing the flow. D. K. Moore.

Fractionation of hydrocarbons. C. P. Dubbs, Assr. to Universal Oil Products Co. (U.S.P. 1,804,553—4, 12.5.31. Appl., [A] 14.1.26, [B] 12.11.26).—The fractionator in each case contains a continuous helical baffle solidly joined to the inner wall, with a central vertical rod to which are attached at intervals vertical baffles. In (A) the surface of the helical baffle has corrugations concentric with the rod; in (B) they are radial and perforated at the crests. D. K. Moore.

Treating petroleum oils. P. M. Travis, Assr. to Travis Process Corp. (U.S.P. 1,798,341, 31.3.31. Appl., 13.7.27).—The free C contained in residual oil from cracking plant is purified by treatment in a centrifuge having a double bowl, the oil flowing through the annular space. The outside of the inner bowl is fitted with a helical rib and is driven at a slightly different speed from that of the outer bowl. Solid matter which is driven by centrifugal force to the wall of the outer bowl is propelled by the action of the helix to one end of the apparatus, where it is received in a collecting ring, purified oil being received at the other end. The operation is carried out at about 55° in a bowl 2 ft. in diam. run at 800 r.p.m. T. A. Smith.

Purification of hydrocarbon oils. Standard Oil Development Co., Assees. of E. M. Clark, R. P. Russell, J. M. Jennings, and G. H. B. Davis (B.P. [A] 360,530 and [B] 360,814, 22.8.30. U.S., 31.8.29).—(A) The anti-detonating characteristics of gasoline and oils containing light naphtha fractions, or (B) the burning qualities of crude kerosene, are improved and both types of oil are desulphurised, by passing the vapours and H_2 at (A) 480—540°/100—200 atm., or (B) 400—460°/200—300 atm., over a catalyst immune from S poisoning and consisting of oxides, sulphides, or salts of metals of groups VI or VIII, with or without the addition of other metallic oxides or sulphides, *e.g.*, oxides of Cr and Mo, with such time of contact that $< 5\%$ of the oil is converted into hydrocarbon gas. The oil is condensed, and the gas scrubbed to remove hydrocarbons and S compounds, *e.g.*, H_2S, and recirculated. It is desirable to add to the feed oil 10—15% of oil with a somewhat higher b.p. D. K. MOORE.

Refining of hydrocarbon oils. REFINERS, LTD., K. COX, and P. J. MCDERMOTT (B.P. 360,358, 28.7.30).—Benzol, petrol, etc. are refined by mixing with 2—2½ wt.-% of a mixture of $Fe_2(SO_4)_3$ and fuller's earth, separating the solids by decantation, neutralising with aq. NH_3, and distilling. The process is continuous. D. K. MOORE.

Refining of hydrocarbons. F. A. APGAR, Assr. to SINCLAIR REFINING CO. (U.S.P. 1,797,255, 24.3.31. Appl., 14.9.28).—The products of vapour-phase cracking are passed in vapour form successively through two separate charges of absorptive catalyst, and before complete deactification of the first charge the sequence in which the vapours pass through the two charges is periodically reversed as the operation continues, the vapours passing downwardly through the second of the two charges. During reversal unrefined vapours are condensed and this condensate is introduced into the charge of catalyst through which the vapours then last pass. H. S. GARLICK.

Refining of hydrocarbons. E. C. HERTHEL, Assr. to SINCLAIR REFINING CO. (U.S.P. 1,797,262, 24.3.31. Appl., 14.9.28).—The condensate obtained when cracked gasoline in the vapour phase is passed over an adsorbtive catalyst is distilled, the residue consisting of undesired polymerides. The life of the catalyst is prolonged if it is washed with the distillate from the polymerised material while the refining operation is in progress. T. A. SMITH.

Purification of cracked petroleum oils and similar cracked products. R. C. OSTERSTROM (B.P. 361,396, 21.7.30).—Cracked petroleum oils are passed through a coil in the liquid phase at 260—315° and under 600—1000 lb./sq. in. pressure, through a bed of fuller's earth to remove discoloration, and are distilled to separate the high-boiling products formed in the coil by the polymerisation of the gum-forming substances. D. K. MOORE.

Method of refining [cracked motor fuels etc.]. R. C. OSTERSTROM and R. T. TUCKER, Assrs. to PURE OIL CO. (U.S.P. 1,797,513, 24.3.31. Appl., 2.2.28).—The cracked spirit is mixed with adsorbent clay and passed through a heated coil, under any desired pressure. The heated mixture is delivered to a vaporiser the lower portion of which is fitted with vertical heating tubes so arranged that clay is not deposited on the tubes, but may be removed from the bottom of the vaporiser, the refined vapours being condensed. In some cases it is not necessary to heat the clay–oil mixture, which is passed direct to a separator in which the clay is continuously removed. T. A. SMITH.

Desulphurising liquid hydrocarbons, H. H. WILSON, Assr. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 1,805,444, 12.5.31. Appl., 11.1.28. Can., 31.1.27).—The S content of gasoline is reduced from 0·11% to 0·065% by bringing it in contact with dry, finely-ground KOH. D. K. MOORE.

Desulphurisation of cracked hydrocarbons. G. EGLOFF, Assr. to UNIVERSAL OIL PRODUCTS CO. (U.S.P. 1,803,964, 5.5.31. Appl., 26.6.26).—Vapours leaving the dephlegmator of an oil-cracking apparatus are subjected to the action of O_3 in the presence of a silent electric discharge. H. S. GARLICK.

Reagent for sweetening gasoline. H. H. CANNON, Assr. to CANNON–PRUTZMAN TREATING PROCESSES, LTD. (U.S.P. 1,798,784, 31.3.31. Appl., 8.7.29).—S is removed from gasoline by adding a small quantity of free S and then bringing it into contact with a mixture of NaOH 3%, $Ca(OH)_2$ 25%, PbO 16%, diatomaceous earth 22%, and H_2O 34%. D. K. MOORE.

[Mineral] oil-purification process. F. M. CLARK and A. T. HARDING, Assrs. to GEN. ELECTRIC CO. (U.S.P. 1,798,968, 31.3.31. Appl., 29.10.28).—Sludge and sludge-forming impurities are extracted from hydrocarbon oils with an ester, *e.g.*, tritolyl phosphate, Bu tartrate or phthalate, and a liquid, *e.g.*, AcOH, EtOH, which renders the ester insol. in the oil. Since the ester, which has good dielectric properties, becomes insol. as the impurities are dissolved the addition of 5—15% to an insulating oil in electrical apparatus keeps that oil in a satisfactory condition. D. K. MOORE.

Treatment of [naphthenic-base crude] petroleum. T. M. ANDREWS and C. E. LAUER, Assrs. to TEXAS CO. (U.S.P. 1,804,451, 12.5.31. Appl., 6.6.25).—The residues obtained when such oils are distilled with NaOH are extracted with hot aq. (80—95%) EtOH, and the EtOH is separated and distilled, leaving the Na salts of the saponifiable matter. The naphthenic acids are subsequently recovered. D. K. MOORE.

Purification of crude paraffin oils and the like. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 359,994, 2.6.30. Addn. to B.P. 315,117; B., 1929, 804).—Paraffin and naphthene hydrocarbons, *e.g.*, petroleum fractions, may be freed at 50—90° from asphaltic and other substances liable to oxidation and resinification by the process of the prior patent. D. K. MOORE.

Benzol recovery process for increasing the yield in light benzols from distillation gases. H. MELCHES (B.P. 360,720, 16.12.30).—The gases, freed from $C_{10}H_8$ and PhOH by spraying with H_2O and then passing through wide settling chambers, are treated in benzol scrubbers with an increased quantity of washing oil, *e.g.*, at least 30% more than that usually used, so that in addition to the light benzol the heavy benzols are also extracted from the raw gas. A. B. MANNING.

Production of motor fuel. W. L. GOMORY (B.P. 359,956, 25.7.30).—Hydrocarbon oils are cracked and fractionated, gasoline is collected, and the intermediate products are recracked. The residue is hydrogenated, the gasoline formed is separated, and the residue (or the products obtained from it by complete evaporation) is (or are) rehydrogenated. If the oil is originally rich in gasoline it is subjected to a primary vaporisation, the gasoline being collected, the intermediates cracked, and the residue hydrogenated. D. K. MOORE.

Production of high-grade motor fuels from heavier carbonaceous material. STANDARD OIL DEVELOPMENT CO., Assees. of E. J. GOHR (B.P. 361,046, 18.9.30. U.S., 19.9.29).—Heavy hydrocarbon oil in which is suspended the finely-divided catalyst is hydrogenated at 470° and up to 200 atm. pressure. Part of the liquid is withdrawn, hydrogenated at 430°/200 atm., and returned to the first hydrogenation vessel. The production of asphalt is reduced without impairing the anti-detonating properties of the fuel. D. K. Moore.

[Identifiable] motor fuels or like combustible liquids. H. Ferguson (B.P. 361,310, 18.6.30).—One or more substances, *e.g.*, phenolphthalein, quinine, $C_{10}H_8$, are added to hydrocarbon oils, *e.g.*, petrol, in quantities $\not>$ 10 p.p.m., so that the detection of the substances (methods for which are given) enables the oil to be identified. D. K. Moore.

Apparatus for manufacture of hydrocarbons products, in particular of lubricating oils, by hydrogenation. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 360,830, 10.7.30).—The raw carbonaceous materials or the products of the hydrogenation are distilled under pressure in a stream of H_2. In the former case the vapours and H_2 are led into the hydrogenating vessel. The H_2 containing a liquid, *e.g.*, H_2O, C_6H_6, EtOH, in the form of mist may be introduced through nozzles. A crude oil boiling below 325° yields spindle and machine oils. D. K. Moore.

Production of lubricating oils. E. R. Lederer, Assr. to Texas Pacific Coal & Oil Co. (U.S.P. 1,803,941, 5.5.31. Appl., 5.3.29).—Gasoline, kerosene, gas oil, cracking stocks, etc. are distilled from a paraffin-base crude oil, but the process is conducted at a temp. 20—50° lower than in general practice, using a greater amount of steam and prolonging the time by 6—8 hr. in order to obtain a residue in which the wax is substantially all in the amorphous form. The residue, after ageing for 30—60 days at an even temp., is treated with a min. of 35 lb. of H_2SO_4 per barrel at 46—52°. The acid sludge is separated and the oil, after allowing to settle, is treated with decolorising clay at approx. 215°. The oil–clay mixture, reduced to 57°, is diluted with naphtha and filtered. More naphtha is added, the diluted oil chilled gradually (2½°/hr.) to about —11° and then more rapidly to —29° to —40°, and the congealed wax centrifuged from the oil. The dewaxed oil, after removal of diluent, has viscosity (Saybolt) above 90 sec. at 99° and a cold test below 32°. H. S. Garlick.

Lubricating compound. G. L. Southard (U.S.P. 1,804,124, 5.5.31. Appl., 24.11.26).—The unfiltered residuum from a naphthene–paraffin base crude petroleum, *e.g.*, Franklin heavy crude, that has been reduced by distillation to a flash test ranging from approx. 150° to 344°, as required for certain stated purposes, is incorporated with 5—20% of Al stearate.

H. S. Garlick.

Heat treatment of acid sludge and like residues [acid tars]. Pape & Co. G.m.b.H. (B.P. 360,901, 12.8.30. Ger., 26.2.30).—Light liquid hydrocarbons are obtained by heating acid sludge to 700—800° in a vessel internally coated with a glaze, a suitable composition for which is 50% of NaOH, 20% of water-glass, 4% of $MgSO_4$, 2—3% of burnt MgO, and remainder H_2O. D. K. Moore.

Working up the residues obtained when acid-containing mineral oils are distilled over alkalis or alkaline earths. Deuts. Gasolin A.-G. (B.P. 360,277, 20.1.31. Ger., 23.1.30).—The residues containing Na or Ca salts of naphthenic acids are decomposed by H_2SO_4 and the naphthenic acids separated; if the residues are first mixed with a hydrocarbon oil, *e.g.*, gas oil, the naphthenic acids remain in solution in the oil.

D. K. Moore.

Recovery of oil from aqueous emulsions thereof. E. Erfurt (B.P. 361,728, 5.2.31).—To effect separation the emulsions are caused to flow in a thin layer down an inclined heated plate fitted with baffles. D. K. Moore.

Manufacture of conversion products of higher paraffin hydrocarbons containing sulphur. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 360,993 and Addn. B.P. 361,356—7, [A–C] 19.8.30).—(A) Unsaturated and halogen-free aliphatic hydrocarbons (C_8 or above) or substances made according to B.P. 339,962 and B.P. 343,948 (B., 1931, 194, 578) are treated with sulphurising agents, *e.g.*, S, sulphides, polysulphides, preferably by heating under pressure, and with or without the addition of a solvent (*e.g.*, H_2O, CCl_4, *cyclo*hexanol). (B) Halogenated derivatives of such paraffin hydrocarbons, or the products obtained by treating the polyhalogenated derivatives with NH_3 and alkalis in so far as they are unsaturated and contain replaceable halogen, may be used as the starting materials. (C) The compounds made according to (A) are oxidised by HNO_3, H_2O_2, $KMnO_4$, etc., with or without the addition of an org. solvent, to sulphonic acids. The products are useful in the textile industry and have therapeutic application.

D. K. Moore.

Revivifying spent fuller's earth. N. E. Lemmon, Assr. to Standard Oil Co. (U.S.P. 1,805,178, 12.5.31. Appl., 20.3.25).—The spent earth, particularly that which has been used for refining petroleum oils, is successively treated with naphtha, washed with a mixture of 25—75% of naphtha, 2—25% of MeOH, EtOH, or PrOH, and $\not<$ 20% of C_6H_6, and heated to redness. L. A. Coles.

Revivifying used decolorising materials [clays etc. from petroleum refining]. C. K. Parker and F. A. Bent, Assrs. to Standard Oil Co. (U.S.P. 1,806,020, 19.5.31. Appl., 22.8.27).—The clay etc., after washing with light oil and air-blowing, if desired, is heated at 400—510° in the presence of a non-reacting gas (steam) and then at 510—620° in the presence of air and steam.

L. A. Coles.

Generation of power [by use of oil vapours from cracking stills]. L. Kirschbraun (U.S.P. 1,804,561, 12.5.31. Appl., 29.12.19. Renewed 1.10.27).—A turbine is inserted in the vapour line. B. M. Venables.

Compressing the charge of coal in chamber ovens. C. Still (B.P. 362,783, 28.2.31).

Valves for pulverised coal or the like. Gen. Electric Co., Ltd., and J. F. Benning (B.P. 362,103, 22.10.30).

Coke-oven doors. P. van Ackeren, Assee. of H. Koppers A.-G. (B.P. 362,276, 13.3.31. Ger., 14.3.30).

Doors of ovens, retorts, etc. for carbonising coal or other materials. Gas Chambers & Coke Ovens, Ltd., N. J. Bowater, and F. Ritson (B.P. 361,929, 27.8.30).

Anchoring devices for coke and chamber ovens. C. Still (B.P. 362,544, 17.9.30).

Wet-separating tanks. Centrifugal separators [for transformer oils]. Distillation. Reactions under high pressure. Dephlegmators. Washing flue gases. Fractionating (etc.) gas mixtures.—See I. **Crude MeOH. Hydrogenation of carboxylic acids.**—See III. **Fibrous products.**—See V. **NH_4HCO_3 from NH_3 liquors. $(NH_4)_2SO_4$. N_2 and H_2 from fuels. S-sludge treatment.**—See VII. **Road-building materials.**—See IX. **Marine paint. Ink. Colloidal aq. solutions of wax.**—See XIII. **Fertiliser from coal.**—See XVI. **Denatured spirits.**—See XVIII.

III.—ORGANIC INTERMEDIATES.

Determination of moisture and the azeotropic factor in methyl alcohol. W. SWIENTOSLAWSKI and J. SZMIGIELSKA (Rocz. Chem., 1931, 11, 719—726).—The authors' method (A., 1932, 33) is applied to the determination of H_2O in EtOH, using C_6H_6 as the third constituent, and to the determination of C_6H_6 in its mixtures with EtOH, using H_2O. The relative error obtained using this method is $<$ 0·003%, whilst the abs. error is 0·007—0·008%. R. TRUSZKOWSKI.

Preparation of coumarone by Krämer and Spilker's method. N. N. BURDA and V. D. SUKATSCHEVA (Ukrain. Chem. J., 1931, 6, [Sci.], 169—171).—The yield of impure coumarone obtained from solvent naphtha, b.p. 140—200°, using this method, is about 0·11%. R. TRUSZKOWSKI.

Reduction of $PhNO_2$.—See XI.

See also A., Dec., **Preps.** of (1395) ***n*-decoic acid,** (1402) **glycine and sarcosine,** and (1405) **cinnamyl chloride and its Grignard reagent.** 1406, **Apparatus for pyrolytic production of Ph_2.** 1408, **Derivatives of naphthalene-2-sulphonic acid.** 1414, **Prep. of *m*-hydroxybenzonitrile.** 1419, **Derivatives of bromobenzanthrone.** 1420, **Condensation of dinitrophthalic acid with PhMe. 1 : 3-Dichloroanthraquinone.** 1455, **Determination of citric acid.** 1458, **$COMe_2$–BuOH by fermentation.** 1459, **AcOH from maize stalks. Lactic acid fermentation.**

PATENTS.

Continuous rectification of crude methyl alcohol. E. A. BARBET (U.S.P. 1,805,559, 19.5.31. Appl., 22.12.25. Fr., 22.12.24).—Rectified (conc. to $\nless$ 90° Gay Lussac) crude MeOH, free from tar, is treated with a countercurrent stream of aq. caustic alkali. $COMe_2$ is insol. and is separated and rectified, whilst the MeOH dissolves and is recovered by distillation and then rectified; the lye may be used repeatedly until saturated with NaOAc. Continuous-acting plant is described. E. LEWKOWITSCH.

Manufacture of denatured spirits. R. H. MCKEE (U.S.P. 1,804,632, 12.5.31. Appl., 9.5.25).—MeOH and EtOH are denatured by the addition of olefinic hydrocarbons and pyridines obtained from one of the fractions distilled from shale oil. C. RANKEN.

Dehydration of alcohol. O. VON KEUSSLER and D. PETERS (U.S.P. 1,808,271, 2.6.31. Appl., 10.4.28. Ger., 6.5.27).—Aq. spirit is heated under pressure with CaO in powder form, and after the main portion of the abs. EtOH has been distilled off, the last traces of EtOH are extracted from the residual hardened CaO by distillation in vac. with vigorous agitation. (Cf. B., 1929, 491.) C. RANKEN.

Removal of water from aqueous acetic acid. H. T. CLARKE and D. F. OTHMER, Assrs. to EASTMAN KODAK CO. (U.S.P. 1,804,745, 12.5.31. Appl., 12.11.27).—*s*-Dichloroethylene is used as auxiliary liquid in the removal of H_2O by distillation from aq. AcOH of any dilution, in the absence of solvents of b.p. higher than that of AcOH. Continuous-working apparatus is described, in which the dil. acid is introduced at an intermediate position in the fractionating column, and the reagent added at the top; the $C_2H_4Cl_2$–H_2O mixture of const. b.p. is drawn off at the top and the dehydrated $C_2H_4Cl_2$–AcOH removed from the bottom for separation by distillation. E. LEWKOWITSCH.

Production of concentrated [lower] aliphatic [acetic] acids. H. DREYFUS (B.P. 356,787, 13.5.30).—The entraining liquid and the dil. AcOH (etc.) are homogeneously mixed, *e.g.*, by adding sufficient conc. AcOH (etc.), before distillation. Continuous processes are described. C. HOLLINS.

Concentration of solutions of lower aliphatic [acetic] acids. BRIT. CELANESE, LTD., H. F. OXLEY, and L. FALLOWS (B.P. 356,741, 30.5.30).—In the concn. of AcOH (etc.) by the azeotropic-mixture method, vapours of the entraining liquid are led into the dil. acid, or are mixed with vapour of dil. acid. The mixed vapours pass into a fractionating column. Suitable liquids are C_6H_6, xylene, di- or tri-chloroethylene, EtOAc, etc. C. HOLLINS.

Purification of [fermentation] lactic acid. R. VON WÜLFING and E. MÖLLER (J. A. WÜLFING), and H. UMBER (B.P. 356,600, 10.12.30).—Malodorous impurities are extracted from crude fermentation lactic acid by shaking with small quantities of a chlorinated CH_4 or C_2H_6 or by CS_2. The solvent is recovered by adding $Ca(OH)_2$ and distilling. C. HOLLINS.

Catalytic hydrogenation of carboxylic acids and their derivatives. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 356,731, 1.3. and 25.6.30).—Aliphatic or *cyclo*aliphatic mono- or poly-carboxylic acids above C_5, or their esters etc., are hydrogenated in liquid or vapour phase below decomp. temp., *e.g.*, 170—250°/40—400 atm., in presence of an activated hydrogenation catalyst, *e.g.*, reduced $CuCrO_4$ and SiO_2, pyrophorous Co, Co and K_2O, Co and 2% V_2O_5, reduced $CoCO_3$ and $CuCO_3$, etc. Alcohols are thus obtained from Et oleate, oxidised paraffin wax, palmitic and stearic anhydides, Me stearate, olive oil, soya-bean oil, castor oil, lauric amide or anhydride, Et adipate, Me ester of bleached montan wax, and montanic acid. C. HOLLINS.

Catalytic production of amines. IMPERIAL CHEM. INDUSTRIES, LTD. From E. I. DU PONT DE NEMOURS & CO. (B.P. 355,867, 20.6.30).—The production of undesired amines, whether primary, *sec.*, or *tert.*, is suppressed by addition of such amines to the mixture of lower aliphatic alcohol and NH_3; the undesired amines are subsequently separated and added to the next batch. With MeOH, NH_3, and NMe_3 over $Al(OH)_3$ at

450° a conversion of 49 mols. % into $NHMe_2$ and 8 mols.% into NMe_3 takes place; MeOH and NH_3 with $NHMe_2$ and NMe_3 give mainly NH_2Me. C. Hollins.

Manufacture of highly viscous solutions from polyvinyl alcohols. I. G. Farbenind. A.-G. (B.P. 356,408, 29.7.30. Ger., 29.7.29).—Aq. polyvinyl alcohols of low or high viscosity are condensed with an aldehyde under such conditions as to avoid formation of insol. products, *e.g.*, 100 pts. of a low-viscosity alcohol with 125 pts. of 30% CH_2O, or 100 pts. of a high-viscosity alcohol with 25 pts. of paraformaldehyde, at 60—65°. With glyoxal, aldol, MeCHO, PhCHO, etc. more of the aldehyde and higher temp. can be employed. The products are used for emulsifying dyes, sizing, dressing, or printing. C. Hollins.

Manufacture of condensation products of high mol. wt. I. G. Farbenind. A.-G. (B.P. 361,910, 14.8.30. Ger., 14.8.29).—A polyvinyl alcohol is condensed with an aldehyde (*e.g.*, CH_2O) and a substance capable of condensing with aldehydes (*e.g.*, a phenol, aromatic amine, urea, gelatin, casein) to yield insol. or H_2O-sol. products. Examples are given in which horn-like or mouldable masses, emulsifiers, tanning agents, and materials suitable for making dye pastes or elastic lacquers are the products. E. Lewkowitsch.

Production of 1 : 3- [αγ]-butylene glycol [from aldol]. Lonza Elektrizitätswerke u. Chem. Fabr. A.-G. (B.P. 356,603, 15.12.30. Switz., 13.12.29).—Aldol is hydrogenated under pressure in presence of BuOH and a highly active Ni, Co, Fe, or Cu catalyst prepared by stepwise reduction. C. Hollins.

Manufacture of diacetone alcohol. Usines de Melle (formerly Soc. Anon. des Distilleries des Deux-Sèvres) (B.P. 356,609, 30.12.30. Fr., 4.1.30).—$COMe_2$ is aldolised with enough alcoholic alkali (KOH) to give a reaction with cresol-red but not with *o*-cresolphthalein. C. Hollins.

Preparation of higher aliphatic alcohols. H. T. Böhme A.-G. (B.P. 356,606, 18.12.30. Ger., 27.1.30).—Esters of fatty acids above C_7 are reduced with H_2 under pressure at 300—400° in presence of finely-divided Cu, preferably on keiselguhr. Examples are: lauryl alcohol from Et laurate; alcohols from esters of coconut-oil acids. C. Hollins.

Manufacture of esters of sulphonated fatty acids [wetting and dispersing agents]. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 356,166, 2.6.30. Cf. B.P. 343,989; B., 1931, 501).—A neutralised, sulphonated, unsaturated or hydroxylated fatty acid (oleic acid) is esterified with a lower aliphatic monohydric alcohol (MeOH, EtOH) in presence of an acid catalyst ($ZnCl_2$), to give wetting, emulsifying, and dispersing agents. C. Hollins.

Manufacture of sulphonic acids [wetting and dispersing agents]. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 356,218, 4. and 30.6.30).—A sulphonated alkyl or aralkyl halide is condensed with an aliphatic amine above C_8; or an aralkyl halide is condensed with the amine and sulphonated. The products are washing, wetting, and dispersing agents unaffected by salts or acids. Examples are: β-chloroethane-α-sulphonic acid or *p*-sulphobenzyl chloride with heptadecylamine; CH_2PhCl with heptadecylamine, sulphonated with $ClSO_3H$ in CCl_4. C. Hollins.

Manufacture of styrene. L. Mellersh-Jackson. From Naugatuck Chem. Co. (B.P. 356,107, 21.5.30).—PhEt is chlorinated at 70—120°, and the residue after distillation up to 155° is heated with an org. base (pyridine) at 100—230°. C. Hollins.

Manufacture of optically active phenylpropanolmethylamines [α-methylamino-α-phenyl-*n*-propyl alcohols]. I. G. Farbenind. A.-G. (B.P. 356,931, 29.8.30. Ger., 31.8.29. Addn. to B.P. 354,975; B., 1932, 13).—After resolution by means of *d*-tartaric acid, the *dl*-base contaminating the *l*-base is removed by addition of the calc. amount of a sol. oxalate (NH_4, Na) to the aq. solution of the mixed hydrochlorides, sulphates, tartrates, etc.; or the *l*-base is liberated preferentially from the solution of the salts by addition of alkali (Na_2CO_3). C. Hollins.

Manufacture of *p*-nitrosoamino-compounds or *p*-quinoneoxime-imino-compounds of the aromatic series. I. G. Farbenind. A.-G. (B.P. 355,970, 15.9.30. Ger., 14.9.29).—*p*-Xylidine, *o*-3-xylidine, α-naphthylamine, or *ar*-tetrahydro-α-naphthylamine is treated with HNO_2 in conc. H_2SO_4 or oleum to give the *p*-nitroso-compound or the quinonimine oxime. 5-Nitroso-*p*-2-xylidine, m.p. 183° (decomp.; sulphate, decomp. 125°), 6-nitroso-*o*-3-xylidine, decomp. 194° (sulphate, decomp. 182°; hydrolysed to 2 : 3-dimethyl-*p*-benzoquinoneoxime, m.p. 200°), 4-nitroso-5 : 6 : 7 : 8-tetrahydro-α-naphthylamine, decomp. 126° (sulphate, decomp. 190°; reduced to the diamine, m.p. 83°), and 4-nitro-α-naphthylamine, decomp. 150°, are described. C. Hollins.

Manufacture of condensation products [of the diphenyl type] from aromatic hydrocarbons. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 356,189, 2.5.30).—Aromatic hydrocarbons, having no side-chain above C_1, are converted into diphenyls etc. at 500—800° in presence of a catalyst comprising one or more difficultly reducible and infusible metal oxides, in absence of O_2. The catalyst may be graphitised. Preferably the speed of the vapours over the catalyst should be such that conversion does not exceed 15% in one operation. Inert diluent gases may be used. C_6H_6 over graphitised MgO at 775° gives Ph_2; $C_{10}H_8$ over graphitised Al tungstate at 700° yields αα′- and ββ′-dinaphthyls, m.p. 156° and 186°, respectively. C. Hollins.

Production [separation] of halogenoanthraquinones. R. J. Loveluck, R. F. Thomson, J. Thomas, and Imperial Chem. Industries, Ltd. (B.P. 356,728, 6.6.30).—Mixtures of α- and β-halogenated anthraquinones free from other substituents, such as are obtainable from mixed halogenated phthalic anhydrides, especially from 3 : 4- and 4 : 5-dichlorophthalic anhydide, are separated by fractional dilution of their solution in H_2SO_4, oleum, or $ClSO_3H$; 2-chloroanthraquinone is pptd. before the 1-chloro-compound, 2 : 3-dichloro- before 1 : 4-, 2 : 3- before 1 : 2-, 1 : 2- before 1 : 4-. C. Hollins.

Products of paraffin hydrocarbons.—See II. **Metal alkyl compounds.**—See VII. **Colour lakes.**—See XIII. **Phenol-CH_2O compounds.**—See XV.

IV.—DYESTUFFS.

Luminescence of naphthol AS products.—See VI.

See A., Dec., 1353, **Photoluminescence of fluorescent dyes.** 1354, **Chemiluminescence in oxidation of dyes.** 1388, **Apparatus for analytical control.** 1407, **NH_2Ph and MeCl.** 1408, **Derivatives of naphthalene-2-sulphonic acid.** 1409, **Colour of azo dyes. Dyes from fluorenone. Aromatic diazo compounds.** 1411, **Dinaphthyl derivatives.** 1419, **Derivatives of bromobenzanthrone.** 1420, **Synthesis of alizarin. 3-Iodoalizarin.** 1423, **1 : 4-βα-Naphthapyrones. Synthesis of anthocyanins.** 1426, **Effect of unsaturated chromophores on pyronine dyes.** 1427, **Azopyrrole-blacks.**

Patents.

Manufacture of leuco-sulphuric acid esters or ester salts of the ureas of leuco-β-aminoanthraquinone and nuclear substitution products thereof. A. Carpmael. From I. G. Farbenind. A.-G. (B.P. 356,805, 12.6.30).—The sulphuric ester of leuco-β-aminoanthraquinone or its derivatives (*e.g.*, 3-bromo-, 5-chloro-) is phosgenated. The products give yellow dyeings on development with an acid oxidant.

C. Hollins.

Manufacture of dyes [of the acridine series]. Durand & Huguenin A.-G. (B.P. 357,060, 13.2.31. Ger., 15.2.30. Addn. to B.P. 316,315; B., 1930, 604).—Acridine-orange is nitrated, reduced to the leuco-amino-compound, and finally oxidised (*e.g.*, with $FeCl_3$) to give brown to violet-brown dyes for tannined cotton.

C. Hollins.

Manufacture of metalliferous [azo] dyes. Soc. Chem. Ind. in Basle (B.P. 356,716, 6.6.30. Switz., 8.6.29).—Azo dyes (free from solubilising groups) of the type: an *o*-aminophenol → a naphthylamine, or an aminonaphthol, or an *N*-acylaminonaphthol, are boiled with the metal-yielding compound in presence of an org. base (not containing an *N*-hydroxyalkyl group) and in absence of added H_2O; pyridine is preferred. Examples are: 5-nitro-*o*-aminophenol → β-naphthylamine (+ Cr, for yellow-green varnish; + Fe, brown-violet), or 2 : 7-aminonaphthol in acid (+ Cr, bluish-green), or in alkali (+ Cr, red-blue); *o*-aminophenol → β-naphthylamine (+ Cr, blue-green), or 1-acetamido-7-naphthol (+ Cr, red-blue); 4-chloro-*o*-aminophenol → β-naphthylamine (+ Cr, blue-green; + Co, blue-violet), or 1 : 7-aminonaphthol in alkali (+ Cr, greyish blue-green); 4-nitro-*o*-aminophenol → β-naphthylamine (+ Cr, olive-green), or 2 : 5-aminonaphthol (+ Cr, yellow-green), or 1-acetamido-7-naphthol (+ Al, violet); 4-chloro-5-nitro-*o*-aminophenol → β-naphthylamine (+ Cr, bluish-green); picramic acid → β-naphthylamine (+ Cr, olive-green). C. Hollins.

[Manufacture of] sulphur dyes, especially sulphur-blacks. E. I. Du Pont de Nemours & Co. (B.P. 357,065, 25.2.31. U.S., 25.2.30).—A mixture of sulphide dye (sulphur-black) paste and sufficient Na_2S to render it directly sol. is dried on a drum and obtained in flakes. Preferably the sulphide dye is of colloidal fineness and free from free S. C. Hollins.

Filter diaphragm.—See I. **Products of high mol. wt.**—See III.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Relation between the twist and certain properties of rayon yarns. H. A. Hamm and R. S. Cleveland (Bur. Stand. J. Res., 1931, 7, 617—620).—The breaking strength is not affected by an increase in twist up to 20 turns per in., but thereafter decreases rapidly. With increasing twist the proportional limit and stretch at break decrease and the denier increases. The contraction caused by twisting is greater for lower tensions and for higher deniers. E. S. Hedges.

Plasticising of cellulose acetate. N. Ishii (J. Cellulose Inst., Tokyo, 1931, 7, 235—243).—A marked increase in the elongation of cellulose acetate film occurs when its content of the plasticiser (Ph_3PO_4) is so high that visible crystals appear on the surface of the film, *i.e.*, at a concn. of about 30%. When cellulose acetate films are caused to swell in EtOH containing various amounts of different plasticisers, the alcoholic gel formed apparently acts as a solvent for the plasticisers, which are distributed between the liquid and gel in accordance with Henry's law. The efficiency of the plasticiser towards cellulose acetate increases with increasing affinity, viscosity, and surface tension. Increase of plasticity is ascribed to the permanent swollen state of the cellulose acetate, whereby the mutual cohesive power of the micelles is decreased by the intra-micellar swelling, and the ability of the micelles to slip is increased by the " inner lubricating effect " of the plasticiser. B. P. Ridge.

Determination of acetic acid in cellulose acetate. E. Berl, G. Rueff, and W. Wahlig (Chem.-Ztg., 1931, 55, 861—862).—The acetate (0·5 g.) is hydrolysed by shaking with 20 c.c. of 89% H_3PO_4 on the water-bath until all has dissolved, and then steam, free from CO_2, is passed through the hot mixture until the vol. in the flask exceeds 75 c.c., but not 100 c.c., and the distillate measures about 450 c.c. The AcOH is then titrated with 0·2*N*-$Ba(OH)_2$ (phenolphthalein).

A. R. Powell.

Properties of kraft pulp from spruce and pine wood. E. Hägglund and C. Nyman (Zellstoff u. Papier, 1931, 11, 687—688).—In the prep. of kraft pulp from different samples of spruce and pine wood by the same procedure, no important differences in the cooking, or between the chemical properties (yield, % lignin, pentosan, and H_2O, Et_2O, or EtOH extracts, etc.) of the products are found, but the pulp from the spruce wood has a tearing length 20%, and a number of double creasings 60%, higher than that from the pine wood.

B. P. Ridge.

Sizing tests [on paper]. E. C. Hendrickson (Pulp and Paper Mag., 1931, 31, 1319—1320).—Various methods for measuring the degree of sizing of papers forming raw stock for coating have been investigated. Ink penetration is most susceptible to temp. and humidity, and must be determined under controlled conditions. Water penetration is rapid, but the range of penetration times is not great enough for accurate differentiation of papers of similar type. The Valley sizing tester yields reproducible results little affected by atm. conditions. Porosity (air-permeability) is no indication of degree of sizing. T. T. Potts.

Lignin in wheat straw.—See XVI.

See also A., Dec., 1401, **Synthetic cellulose etc. from dextrose. Pine-wood lignin.** 1456, **Action of pancreatin on wool.**

Patents.

Production of compound materials or fabrics [artificial leather] from fibres. Società Invenzioni Brevetti Anonima Torino, Assees. of A. MacKay (B.P. 360,968, 14.8.30. U.S., 20.9.29).—A suspension in H_2O of animal and vegetable fibres is treated with a tanning solution and an emulsifiable oil (sulphonated cod oil, colloidal neatsfoot oil, etc.) and neutralised with a mild alkali (Na_2CO_3). After addition of a binding material (rubber latex), the slurry is acidified to coagulate the rubber on the fibres and made into sheet. F. R. Ennos.

Manufacture of moulded, waterproof, fibrous products. H. D. Elkington. From Flintkote Co. (B.P. 359,902 and 359,950, 21.7.30).—(b) A mixture of fibrous stock with an aq. dispersion of a bituminous substance (asphalt) or an artificial aq. dispersion of rubber is treated so that the dispersed particles of bitumen or rubber are pptd. on the fibres by (a) addition of a fixing agent formed *in situ* from at least two reagents, *e.g.*, Na silicate or resinate and alum, the addition of one of the reagents being regulated so that the p_H of the stock is brought to the val. corresponding to the isoelectric point of the fixing agent; the mixture is then forced against a foraminous mould by suction or pressure. F. R. Ennos.

Manufacture of cellulose. G. de Bartillat (B.P. 360,023, 31.7.30).—Wood chips, shavings, sawdust, etc. are heated at 100—110°/20—25 atm., with water containing at least 25 wt.-% of SO_2, together with Pb, Sn, Al, or their oxides as catalysts. F. R. Ennos.

Preparation from wood fibre or other like material of cellulose for use in the manufacture of viscose etc. E. W. Roberts (B.P. 361,022, 3.9.30). —After separation of the bulk of the H_2O by settling, screening, etc., the cellulose pulp is allowed to dry out slowly by the gradual application of heat without pressure in or adjoining the building where the viscose is manufactured, so that no subsequent disintegration is needed before conversion into alkali-cellulose. F. R. Ennos.

Production of viscose complexes. W. Mendel (B.P. 361,405, 20.8.30).—In order to hasten maturing and subsequently to stabilise normal alkali-cellulose, $<4{\cdot}5\%$ of Na_3PO_4 or its PO_4''' equiv. is added before or during the ageing stage. F. R. Ennos.

Manufacture of (a) aqueous solutions of silk fibroin, (b) silk fibroin soluble in water. I. G. Farbenind. A.-G. (B.P. 361,820 and 361,828, [a] 2.6.31, [b] 3.9.31. Ger., [a] 10.6.30, [b] 23.12.30. [a] Addn. to B.P. 355,161; B., 1931, 967).—(a) The fibroin solution is more stable and gives products of improved quality if the NH_3 is rapidly eliminated during the mixing of the anhyd. NH_3 solution of fibroin with H_2O. This may be effected by, *e.g.*, mixing the two solutions with agitation *in vacuo*, the H_2O being maintained at 5—10° during the mixing operation and subsequently raised to 15—20°, or by spraying the fibroin solution on to the surface of the H_2O in a strong current of air and with application of heat, the residual NH_3 being then removed *in vacuo*. (b) Silk fibroin is recovered from its solution in anhyd. NH_3 by volatilising the NH_3. Thus the solution may be atomised into a vac. or into a current of an inert gas (*e.g.*, NH_3 gas itself) at 40°. D. J. Norman.

Treatment [saccharification] of cellulosic materials. Brit. Celanese, Ltd., H. F. Oxley, W. H. Groombridge, and W. Challis (B.P. 360,981, 16.8.30).—The conc. acid used in the saccharification is recovered by extraction with $COMe_2$. The acid cellulose solution is stirred into a quantity of $COMe_2$ equal to about twice the wt. of conc. acid originally used, and the pptd., granular, cellulose-conversion product is then washed with $COMe_2$ and completely hydrolysed by boiling with, *e.g.*, 0·5—5% H_2SO_4. The primary hydrolysis must not be so prolonged that $COMe_2$-sol. dextrins and sugars are formed. The $COMe_2$–H_2SO_4 mixture is separated into its components by distillation. D. J. Norman.

Treatment [bacterial isolation] of cellulosic materials. A. M. Buswell and C. S. Boruff (B.P. 360,922, 13.8.30. U.S., 15.8.29).—Cornstalks, bagasse, and similar cellulosic material is soaked or cooked for about 1 hr. with dil. acid (*e.g.*, 2% H_2SO_4) or alkali, *e.g.*, lime-water, neutralised, and subjected to the action of active anaerobic and/or aerobic bacteria from sewage sludge until the pithy matter has been decomposed, leaving a fibrous residue suitable for papermaking. 25—50% of the raw material is decomposed, 90% of which appears as gas with 54% CH_4. Suitable apparatus is described. D. J. Norman.

Production of artificial horse-hair-like structures. Verein. Glanzstoff-Fabr. A.-G. (B.P. 361,244, 28.3.31. Ger., 31.3.30).—After traversing a long path through a pptn. bath of H_2SO_4 or acid salt solutions, the threads (viscose) are passed round a delivery roller on a horizontal axis, and thence to a plate or can rotating slowly about a vertical axis, the cake of thread being continuously fixed during its formation by a suitable liquid trickling over it. F. R. Ennos.

Spinning pots used in manufacture of rayon. F. Honda (B.P. 361,064, 13.10.30).—An acid-proof pot of smooth surface comprises pith, peel, and liner portions made of paper or cloth impregnated with a PhOH–CH_2O condensation product. F. R. Ennos.

Centrifugal spinning pots [for artificial silk]. E. Svatek (B.P. 361,612, 21.11.30. Ger., 21.11.29).—Pots of compressed fibrous matter impregnated with artificial resin are reinforced by layers of stratified cellulose and artificial resin (hard paper, hard fabric, impregnated filaments). F. R. Ennos.

Manufacture of artificial [viscose] fibres. I. G. Farbenind. A.-G. (B.P. 361,760, 6.3.31. Ger., 6.3.30). —Viscose silk of high strength ($>$ 2 g. per denier, *e.g.*,

3—3·5 g. per denier) is obtained by spinning viscose solution prepared from unripened or but slightly ripened alkali-cellulose into an acid bath containing 10—30% of free H_2SO_4 and $\nless$ 30% of NH_4HSO_4, and stretching the filaments during their passage through the bath. The bath is preferably maintained at 30—50° and the NH_4HSO_4 may be wholly or partly replaced by an equimol. quantity of another bisulphate.
D. J. Norman.

Treatment of textiles made of or containing organic derivatives of cellulose. Brit. Celanese, Ltd., W. A. Dickie, and F. B. Hill (B.P. 360,938, 14.7.30).—Cellulose ester or ether silk may be removed from fabrics containing it by treating the material with a solution of an inorg. salt in an org. liquid (both salt and liquid having a solvent or latent solvent action on the cellulose derivative) and drying the treated fabric at 100—110°. The cellulose ester or ether is readily removed from the treated portion of the fabric by brushing. A suitable treating agent contains NH_4CNS 50 pts., $COMe_2$ 50 pts., diacetone alcohol 5 pts.
D. J. Norman.

Cutting of films of regenerated cellulose, cellulose compounds, or gelatin. Wolff & Co. Komm.-Ges. auf Akt., and R. Weingand (B.P. 361,790, 30.3.31. Ger., 13.5.30).—The warmed films are first coated with a wax and/or grease by rubbing, stacked, and then cut; the cuts thus obtained are free from cracks and the films do not stick together. F. R. Ennos.

Treatment of regenerated cellulose threads and apparatus therefor. Acme Rayon Corp. (B.P. 361,361, 15.5.30. U.S., 9.4.30).—The treating liquid is forced transversely through the thread package, which is permitted to expand longitudinally a predetermined limited amount proportional to the number of filaments forming the thread, the time of treatment depending on the temp. of the liquid. F. R. Ennos.

Working up the waste liquors of the cuprammonium silk stretch-spinning process. Brit. Bemberg, Ltd. (B.P. 361,240, 21.3.31. Ger., 28.3.30).—The pptg. liquor, normally highly dil. and containing about 0·01% Cu, is treated with excess of alkali, preferably lye which has been used in the prep. of the cotton, and then with its equiv. of $MgSO_4$. The pptd. $Mg(OH)_2$ carries down the Cu, leaving a harmless effluent (aq. Na_2SO_4). The sludge is separated and treated with sufficient dil. H_2SO_4, preferably from the silk-washing process, to dissolve the $Mg(OH)_2$ (for re-use) and convert the $Cu(OH)_2$ wholly or partly into the insol. basic sulphate. This latter, after removal of cellulose degradation products by careful washing with cuprammonium solution or by ignition in excess of air at 400°, is dissolved in acid and purified in the usual way. D. J. Norman.

Digestion of raw cellulosic materials for production of paper pulp. J. Bertram & Son, Ltd., J. N. Bertram, and F. W. Gray (B.P. 361,578, 5.11.30).—The crushed material is first cooked with dil. aq. NaOH under steam pressure of 20 lb. per sq. in. to remove starchy matter and pectose, thus rendering it absorbent. After draining off the liquor, the material in the digester is exposed to a vac., treated with hot H_2O which is subsequently drained off, again exposed to a vac., and 12—18% aq. NaOH or Na_2SO_4 is added and allowed to soak into the material, the excess being removed at atm. pressure. The second stage of the cooking is then carried out by means of steam at 40—100 lb./sq. in.
F. R. Ennos.

Manufacture of coated papers. F. W. Bailey, S. F. W. Crundall, H. Spence, and P. Spence & Sons, Ltd. (B.P. 360,034, 1.8.30).—Paper is coated with a "colour" or "enamel" containing finely-divided and close-textured anhyd. $CaSO_4$ in complete or partial substitution for $BaSO_4$, together with china clay and the usual adhesives (casein, gelatin, etc.). F. R. Ennos.

Apparatus for washing and after-treating spun cakes of artificial silk. Verein. Glanzstoff-Fabr. A.-G. (B.P. 362,831, 27.5.31. Ger., 21.11.30).

Bobbin-spinning machines for manufacture of artificial silk. Barmer Maschinenfabrik A.-G. (B.P. 362,224, 31.1.31. Ger., 3.10.30. Addn. to B.P. 361,696).

Treatment of vulcanised fibre [veneer for glueing upon wood]. W. E. Knight (B.P. 360,969, 14.8.30).

Compounds from "black liquor."—See VII. **Insulating materials.**—See XI. **Soaps for sizing paper.**—See XII. **Rubbered fibres.**—See XIV. **Sheet materials from hides etc. Adhesive.**—See XV.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Dyeings on wool fast for bathing purposes. T. Egger (Textilber., 1931, 12, 704—705).—Although vat dyes are most satisfactory as regards fastness to light and sea-water, the difficulties attending their application to wool render it necessary to use selected but less fast acid and mordant wool dyes; a selection of Kiton, Cloth Fast, and Neolan dyes (S.C.I.B.) is given. The sea-water test of the German Fastness Commission is too stringent. Alternative tests which yield results closely agreeing with those obtained by actual wear of coloured bathing garments consist in steeping the coloured wool plaited with white wool (*a*) 3 times daily for 14 days, with intervals of 3—4 hr. between each steeping, for 15 min. in cold sea-water (3·5% NaCl and 0·2% $CaCl_2$) and then drying; (*b*) for 15 min. each morning for 14 days in cold sea-water and allowing to remain wet between the steepings. Test (*b*) is the more severe. The fastness to bleeding in sea-water of a wool dyeing decreases with the depth of shade, and in many instances the alternative tests indicate that dyeings of 50—75% greater depth of shade than those indicated as just satisfactory by the Commission tests have satisfactory fastness.
A. J. Hall.

Luminescence [in ultra-violet light] of Naphthol AS products as an aid to their investigation. O. Mecheels (Textilber., 1931, 12, 581—583).—The luminescence of various aq. solutions of Naphthol AS and of bleached cotton fabric spotted with the same solutions when viewed by transmitted and reflected ultra-violet light (fabric by reflected light only) are recorded. Thus Naphthol AS, white; its Na and K salts, yellow; aq. Naphthol AS prepared with Na_2CO_3 or NH_3 with no caustic alkali present, bluish-white; alcoholic KOH solution, deep yellow (reflected light) or brown (transmitted). Cotton fabric suspended so that it was but partly immersed in the usual Naphthol AS solution (*i.e.*, containing NaOH, CH_2O, and Turkey-red oil) and afterwards dried showed a bright yellow luminescence in the part completely immersed, but successive adjacent bands in the exposed part showed pale blue and dark olive-green luminescence. Under similar circumstances, using a Naphthol AS solution prepared with KOH instead of NaOH, the blue band contracted considerably, and disappeared completely when an alcoholic KOH solution of the Naphthol AS was used. Examination in ultra-violet light of naphthol-prepared fabric is recommended as a means for detecting H_2O spots in large-scale dyeing. Dyeings on cotton with developed direct dyes and Naphthol AS dyes may be distinguished by fully discharging the cotton in a boiling $Na_2S_2O_4$ solution (24 g. of $Na_2S_2O_4$ and 36 g. of NaOH, *d* 1·385, per litre), placing it wet on filter-paper, drying in air, and then examining in ultra-violet light; developed direct dyeings show a white, bluish-white, or violet luminescence on the cotton and a strong luminescence of the stained paper, whilst Naphthol AS dyeings (except Naphthol AS-G) show yellow on the cotton and no appreciable luminescence on the filter-paper.

A. J. Hall.

Determination of size in cotton fabrics. C. Levi [with E. Debenetti] (Boll. Assoc. Ital. Chim. tess. col., 1930, 6, 249—259; Chem. Zentr., 1931, i, 3629).—The official and an enzymic ("rapidase") method give results accurate to 1% except when the cotton has undergone chemical change or retains natural impurities. With fabric dyed with aniline-black the enzymic method gave good results, but the official method high results.

A. A. Eldridge.

Estimation of Mn in textiles.—See XIV.

Patents.

[Wetting-out agents in the] treatment of natural and artifical cellulosic fibres with alkali. Chem. Fabr. vorm. Sandoz (B.P. 359,399, 16.6.30. Ger., 17.6.29).—The wetting-out properties of alkali lyes as used in the mercerisation of cotton are much increased by the addition of mixtures containing 60—98% of phenols and 40—2% of ether derivatives of polyhydric aliphatic alcohols containing at least one free aliphatic OH group. These derivatives are substitutes for the hydrogenated aromatic compounds described in B.P. 279,784 (B., 1928, 228), and may contain one or several alkyl, aralkyl, aryl, alkylidene, aralkylidene, alkylene, aralkylene, or arylene groups additional to the ether group (*e.g.*, alkyl, aralkyl, and aryl ethers of glycol and of polyethylene glycols, the polyethylene glycols themselves, mono- and di-alkyl ethers and the acetals of glycerol). No pptn. of these wetting-out agents occurs even in NaOH lyes of *d* 1·24. A. J. Hall.

Preventing the detrimental formation of lime and magnesia soaps in textile-treatment baths. H. T. Böhme A.-G. (B.P. 361,565, 31.10.30. Ger., 13.12.29).—Sulphonated primary aliphatic alcohols (C_8 or above, *e.g.*, stearyl or lauryl alcohols) are added; admixture with alkali phosphates (*e.g.*, 30%) is advantageous.

E. Lewkowitsch.

Dyeing of regenerated cellulose materials. Imperial Chem. Industries, Ltd. and R. Brightman (B.P. 355,719, 22.5.30).—Level shades on viscose are obtained by using disazo dyes from a tetrazotised 4 : 4′-diamine, $NH_2{\cdot}Ar{\cdot}X{\cdot}Ar{\cdot}NH_2$ (where X = O, SO_2, CO, or CH_2), with 2 mols. of 1 : 5 : 7-aminonaphtholsulphonic acid (M-acid) or with 1 mol. of M-acid (alk.) and 1 mol. of a coupling component other than an aminonaphtholsulphonic acid. Examples are: 4 : 4′-diaminobenzophenone→2 mols. of M-acid (brown); 4 : 4′-diaminodiphenylmethane→Brönner acid and M-acid (brown), or 1-*p*-sulphophenyl-3-methyl-5-pyrazolone and M-acid (yellow-brown); 4 : 4′-diaminodiphenylsulphone→M-acid and 1-*p*-sulphophenyl-3-methyl-5-pyrazolone; 4 : 4′-diaminodiphenyl ether→M-acid and N.W.-acid. C. Hollins.

[Colouring] treatment of textile materials. Brit. Celanese, Ltd., J. A. Wainwright, and J. W. Harrop (B.P. 360,973, 15.8.30).—Readily deformable materials such as knitted fabrics and lace are printed or stencilled while temporarily made rigid by attachment to a woven cotton or other backing fabric (gum arabic may be used as an adhesive) which is subsequently detached.

A. J. Hall.

Coloration of cellulose esters and ethers. Brit. Celanese, Ltd., G. H. Ellis, and H. C. Olpin (B.P. 356,752, 6.6.30).—Acetate silk etc. is coloured by means of unsulphonated azo dyes containing an anthracene (but not an anthraquinone) nucleus. Examples are: *p*-aminodimethylaniline → α-anthrol (golden-yellow); 5-nitro-*o*-anisidine →β-anthramine (red).

C. Hollins.

Carroting composition [for furs]. J. B. Hakim (U.S.P. 1,806,533, 19.5.31. Appl., 14.2.29).—The composition consists of NaOH 2%, Na_2SiO_3 0·014%, Al (dissolved in the NaOH) 0·015%, H_2O 97·971%.

A. J. Hall.

Dyeing or printing mixed fabrics consisting of cellulose ester and cotton. Durand & Huguenin A.-G. (B.P. 359,861, 17.3.31. Ger., 17.3.30).—The method of applying gallocyanine dyes to cellulose ester fibres as described in B.P. 352,808 (B., 1931, 923) is modified so that it also dyes cotton in mixed fabrics. The cotton + cellulose ester fabric is printed or padded with a paste or solution containing the leuco-form of the dye and an oxidising agent (*e.g.*, $NaClO_3$), then dried, steamed, and after-chromed in a cold 0·5% $Na_2Cr_2O_7$ solution. A. J. Hall.

[Synthetic resin products for] finishing of textiles. Imperial Chem. Industries, Ltd., W. Baird, and F. T. Siddle (B.P. 359,897, 23.7.30).—Textile materials (excluding felt) are impregnated with a 3—35% aq. solution of a synthetic resin of the type described in B.P. 356,738 (B., 1931, 1062) and then dried or treated with a metal salt, whereby their elasticity and other physical properties are improved. A. J. Hall.

Machines or apparatus used in the washing, bleaching, and other treatment of woven and other fabrics. A. Melville and A. B. Henshilwood (B.P. 361,937, 24.6.30).

Dyeing and like machines. Mather & Platt, Ltd., and R. C. Mather (B.P. 362,671, 11.12.30).

Shrinking of fabrics. Cluett, Peabody & Co., Inc., Assees. of S. L. Cluett (B.P. 359,759, 20.11.30. U.S., 18.4.30).

Viscous solutions. Wetting etc. agents.—See III. **Insulating fabric.**—See V. **Silk-weighting liquors.**—See VII. **Colouring cement.**—See IX. **Fur skins.**—See XV.

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

Exothermic reactions at high temperatures. D. Binnie and R. V. Wheeler (J.S.C.I., 1931, **50**, 418 T).—Preliminary experiments have been carried out on gaseous exothermic reactions at high space velocity. O_2 is entirely removed from a mixture of air and excess of H_2 in less than 10^{-6} min. at 1200°. Interaction at high speed between H_2 and Cl_2, once started, goes to completion without external heating. With a burner of SiO_2 tubing of bore 0·25 cm., an output of the equiv. of 2·3 tons of 28% HCl per week can be obtained. A max. conversion of about 28% of CH_4 applied into C_2H_2 is effected when CH_4 is introduced into the zone of reaction of an equimol. mixture of H_2 and Cl_2.

Continuous nitric acid concentration in Valentiner installations. V. Donat (J. Chem. Ind., Russia, 1929, **6**, 1787—1788).—Optimal conditions are 90 mm. pressure, 90° gas temp., composition of mixture H_2SO_4 54·19, HNO_3 26·69, lower N oxides 0·37%. The acid obtained averaged 92—98% HNO_3, the H_2SO_4 consumption was 2·5 tons per ton of HNO_3, and the spent acid contained 0·5—2% HNO_3. Chemical Abstracts.

Production of nitric acid by means of ammonia oxidation in presence of water vapour. N. S. Torsnev (J. Chem. Ind., Russia, 1930, **7**, 324—328).—Velocities of reaction are computed for 6 mixtures, and the results are represented by curves. Mixtures containing 71·6% H_2O and no air, after oxidation of NH_3, should produce a gas containing 52·3% NO requiring 1·2 sec. to oxidise to NO_2, and after polymerisation should contain 70% N_2O_4. Chemical Abstracts.

Apparatus for purification of concentrated aqueous ammonia under pressure. J. E. Korobchanski (J. Chem. Ind., Russia, 1930, **7**, 799—800).—Plant for removal of CO_2 and H_2S is described. The theoretical lowest efficiency is the conversion of a solution containing NH_3 120, CO_2 100, and H_2S 30 g. per litre into one containing NH_3 100, CO_2 22·5, and H_2S 13·5 g. per litre; NH_3 lost is about 7·5%. Chemical Abstracts.

Theory of distillation of ammonia solutions. E. Bauman (J. Chem. Ind., Russia, 1930, **7**, 1145—1147).—Data for the design of NH_3-distillation apparatus are given. Chemical Abstracts.

Preparation of soda and of ammonium sulphate. E. I. Orlov (Ukrain. Chem. J., 1931, **6**, [Tech.], 135—136).—A description of Fedotiev and Kolossov's NH_3-soda process (B., 1924, 14). R. Truszkowski.

The Karabugaz problem: soda and ammonium sulphate from Glauber's salt by the ammonia-soda process. V. G. Gulinov and G. V. Petrov (Ukrain. Chem. J., 1931, **6**, [Tech.], 137—154).—The possibilities of exploitation of Karabugaz mirabilite are discussed. R. Truszkowski.

Chemical control of soda crystal manufacture. J. Pospíšil (Chem.-Ztg., 1931, **55**, 902—904).—Cryst. Na_2CO_3 was being manufactured by dissolving soda ash in a pan with direct heat and crystallising. The soda losses and heat balance were determined, the thermal efficiency being 9·7%. As a result of this improvements were made in the treatment of the cleanings from the dissolving pan. It is doubtful whether it is economical to continue crystallisation to completion. C. Irwin.

Theory of Löwig's process. V. I. Sokolov (J. Chem. Ind., Russia, 1931, **8**, 248—252).—At a high temp., $Na_2CO_3 \rightleftharpoons Na_2O + CO_2 - 76{\cdot}88$ cal., but the dissociation pressure is low. The Na_2O is preferably removed by heating with Fe_2O_3; the Na ferrite (probably Na_2O,Fe_2O_3) is decomposed with H_2O affording NaOH and Fe_2O_3. The thermochemistry of the formation and decomp. of Na ferrite is discussed. Chemical Abstracts.

[Manufacture of] potash by the magnesium method. G. I. Chufarov and V. S. Knutarev (J. Chem. Ind., Russia, 1931, **8**, 232—238).—The prep. of $MgCO_3,3H_2O$ from MgO, H_2O, $Mg(HCO_3)_2$, and CO_2 (2—4 atm.) is followed by the conversion $3(MgCO_3,3H_2O) + 2KCl + CO_2 \rightarrow 2(MgCO_3,KHCO_3,4H_2O) + MgCl_2$ at 17—24°. The double salt is then decomposed (*a*) in an autoclave at 115—140°, (*b*) in a closed vessel at 50—80°, (*c*) by heating at 150—180°, (*d*) with $Mg(OH)_2$, with formation of K_2CO_3. Chemical Abstracts.

Stability of chlorinated lime. M. Ageev and B. Podolski (Ukrain. Chem. J., 1931, **6**, [Tech.], 115—121).—The stability of $CaOCl_2$ is adversely affected by Fe_2O_3 in the CaO used for its prep. A more stable product is obtained if cold than if heated Cl_2 is used, whilst previous passage through active C is without effect. R. Truszkowski.

Regeneration of barium carbonate. N. N. Voronin and G. S. Plakhotnyuk (J. Chem. Ind., Russia, 1930, **7**, 798—799).—Conversion of $BaSO_4$ by way of BaS and Ba "saccharate," or directly, into $BaCO_3$, is discussed. Chemical Abstracts.

Physico-chemical principles of the recovery of ammonium sulphate from ammoniacal gases and sulphuric acid. II. E. Terres and G. Patscheke (Gas- u. Wasserfach, 1931, **74**, 761—764, 792—799, 810—814, 837—841; cf. B., 1927, 747).—The heats of reaction of mixtures of NH_3 with indifferent gases with 7—8% H_2SO_4 saturated with $(NH_4)_2SO_4$ and with conc. H_2SO_4 saturated with NH_4HSO_4, and the heat of reaction of a synthetic crude ammoniacal coal gas with 7·8% H_2SO_4 saturated with $(NH_4)_2SO_4$ have been determined at 22—56°. As the vals. found correspond with the heat of neutralisation of free NH_3 with H_2SO_4 within 6% it appears that the occasional lack of heat in the $(NH_4)_2SO_4$ recovery process is not due to the presence of undissociated salt mols. in the gaseous phase. The heat balances of the direct, semi-direct, and indirect $(NH_4)_2SO_4$ processes have been calc. for various NH_3 contents of the crude coal gas and for various saturation temp., and the results are shown graphically. In the direct process heat excess or deficiency in the acid bath is obtained according to the temp., the NH_3 content of the gas, and the form in which the NH_3 exists in the gas; in the semi-direct process insufficient heat of reaction is due to the formation of a supersaturated system on mixing the tar-free crude gases with the NH_3 vapours from the distillation column before passing the gases to the saturator, especially when the gases have a low NH_3 content and when a low cooling temp. is used. In the indirect process sufficient heat is always generated in the acid bath.

A. R. Powell.

Ammonium sulphate and Portland cement from gypsum. D. S. Dorofeev and Z. D. Troitskaja (Ukrain. Chem. J., 1931, **6**, [Tech.], 123—133).—The CO_2 pressure has no influence on the velocity and equilibrium point of the reaction: $CaSO_4 + 2NH_4OH + CO_2 \rightleftharpoons CaCO_3 + (NH_4)_2SO_4 + H_2O$. Addition of clay or of a 10% excess of $(NH_4)_2CO_3$ has similarly no effect, whilst excess NH_3 slightly retards reaction. The velocity of reaction is proportional to the rate of stirring. The solubility of $CaSO_4$ in 25% aq. $(NH_4)_2SO_4$ is 3·043 g. per 100 c.c. of solution 30 min. after mixing; after 60 min. it falls to 1·944 g., indicating rapid dissociation of transiently formed $(NH_4)_2SO_4,CaSO_4$. The residue (chiefly $CaCO_3$) after filtration to remove $(NH_4)_2SO_4$ is suitable for manufacture of Portland cement.

R. Truszkowski.

Purification of brine for Solvay process. N. N. Voronin and G. S. Plakhotnyuk (J. Chem. Ind., Russia, 1930, 7, 319—323).—Cold brine is agitated with CaO in 50% excess, the clear liquid is filtered through limestone, and Ca salts are removed with $(NH_4)_2CO_3$. The purified brine contains Ca 0·004 g. per litre, and is free from Mg. Chemical Abstracts.

Electrolysis of sodium chloride. R. Taussig (Zellstoff u. Papier, 1931, **11**, 692—694).—Modern forms of diaphragm cells are discussed and their efficiencies compared. B. P. Ridge.

Sodium chlorate obtained during electrolysis of sodium chloride by the Griesheim-Elektron method. N. N. Voronin (J. Chem. Ind., Russia, 1930, 7, 960—962).—The process is described. Chlorates are produced as by-products. Chemical Abstracts.

Chlorination of milk of lime at high concentrations for the preparation of calcium chlorate. I. G. Schtscherbakov, E. I. Kruilov, A. A. Morozov, and A. K. Kutarkina (J. Chem. Ind., Russia, 1930, 7, 2039—2042).—The time necessary for chlorination is approx. proportional to the concn. of $Ca(OH)_2$; the rate of flow is of secondary importance in affecting the $ClO_3' : Cl'$ ratio. The optimal temp. is 25—40°. High concns. of $Ca(OH)_2$ can be used. Chemical Abstracts.

Preparation of double and of enriched superphosphates from low-grade phosphorites. S. I. Volfkovitsch and L. E. Berlin (J. Chem. Ind. Russia, 1931, 8, No. 13, 1—11).—A product containing 37—38% P_2O_5 and 1—12% H_2O is obtained by heating phosphorite in a rotating drum for 1—3 hr. at such a temp. that the issuing vapours are at 90—100°.

R. Truszkowski.

Mixing precipitated phosphate with ammonium nitrate. S. I. Aronova (Udobr. Urozhai, 1931, **3**, 252—255).—Very little NH_3 is evolved from mixtures of NH_4NO_3 and phosphate. Chemical Abstracts.

Solubility of phosphates in ammonium citrate. S. S. Dragunov (Udobr. Urozhai, 1931, **3**, 269—273).—When $CaHPO_4,2H_2O$ (50 g.) is shaken with Peterman's solution (500 c.c.) $Ca_3(PO_4)_2$ is formed. At a CaO : citrate ratio of 1 : 4, $Ca(OH)_2$ dissolves completely in Peterman's solution. Chemical Abstracts.

Influence of steam on the solubility of calcium metaphosphates. S. S. Dragunov (J. Chem. Ind. Russia, 1931, 8, No. 13, 11—15).—H_2O retards conversion of $Ca(H_2PO_4)_2$ into metaphosphate at $< 260°$; at 300—450° retardation is not observed, and the product is more readily sol. in H_2O. The solubility of Ca metaphosphates is little affected by heating in the presence of H_2O under 2 atm., but under 15 atm. pressure the content of sol. P_2O_5 rises from 30 to 45%. The product does not give the Mo-blue reaction, but behaves similarly to H_3PO_4 on titration in the presence of phenolphthalein. R. Truszkowski.

Formation of cement-like mass in solvents in production of copperas. V. Zemlyanitzuin and N. Dobrovolski (J. Chem. Ind., Moscow, 1929, **6**, 1599—1601).—The formation of the mass (approx. $FeSO_4,2H_2O$) below 80° depends on acidity as well as on concn. Stirring increases the yield of $FeSO_4,7H_2O$.

Chemical Abstracts.

Production of zinc oxide from zinc ash by the wet process. V. P. Zemlyanitzuin and N. I. Kolesnikov (J. Chem. Ind., Moscow, 1930, **7**, 385—387).—In the prep. of ZnO from the by-product of galvanising Fe the reactions $ZnO + H_2O = Zn(OH)_2$ (in presence of NH_3) and $Zn(OH)_2 + 2NH_4Cl + 4NH_3 = Zn(NH_3)_6Cl_2 + 2H_2O$ are followed by removal of Pb and Cu by means of Zn, oxidation and pptn. of Fe by air, pptn. and drying (140°) of $Zn(OH)_2$. Chemical Abstracts.

Aluminium sulphate from clay of the Polevski district. V. Pershke and N. Lashin (J. Chem. Ind., Moscow, 1930, 7, 954—959).—The clay (34·1% Al_2O_3) is heated at 700° for 2 hr. and then treated with H_2SO_4 for 7 hr., the excess of acid being neutralised by 15% of clay after 5 hr.; 87·6% of $Al_2(SO_4)_3$ is obtained. The residue contained 78·6% SiO_2.

Chemical Abstracts.

Spray drying.—See I. **Fertilisers.**—See XVI.

See also A., Dec., 1358, **Prep. of alkali hydrides.** 1377, **Cryst. B.** 1377, **Anodic pptn. of PbO_2.** 1381, **Decomp. of chromite.** 1388, **Apparatus for analytical control.** 1459, **Fixation of atm. N_2.**

Patents.

Manufacture of hydrocyanic acid and its salts. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 361,004, 21.8.30).—A gas mixture comprising NH_3, at least one hydrocarbon (preferably CH_4), O_2, and, if desired, a diluent (N_2), in proportions such that there is from 0·2 mol. O_2 per mol. each of NH_3 and hydrocarbon to 1 mol. O_2 per C atom and 0·25 mol. O_2 per H atom in the NH_3 and hydrocarbon, is passed at 500—1300° over an oxidation catalyst comprising, *e.g.*, noble or rare-earth metals, oxides, phosphates, etc., which may be deposited on SiO_2 gel (preferably Pt + about 10% Rh); the resulting mixture may be treated for the recovery of HCN or its salts, or for the production of cyanamides. L. A. Coles.

Concentration of aqueous [phosphoric acid] solutions. Metallges. A.-G. (B.P. 361,253, 13.4.31. Ger., 19.4.30).—H_3PO_4 solutions are conc. by treatment with (*e.g.*, by filtration through) $CaSO_4$ poor in H_2O, obtained in the decomp. of phosphates with H_2SO_4 below 200°. L. A. Coles.

Regeneration of active silica gel. G. Kröner and F. W. Stauf, Assrs. to I. G. Farbenind. A.-G. (U.S.P. 1,806,690, 26.5.31. Appl., 6.7.28. Ger., 25.7.27).—The spent gel is treated at 90—150° with a gaseous or liquid oxidising agent, *e.g.*, boiling HNO_3, Cl water, H_2O_2. L. A. Coles.

Recovering ammonium bicarbonate from ammonia liquors. R. Maclaurin (B.P. 360,613, 14.10.30).—A mixture of the vapour from an NH_3 still with gases containing CO_2, *e.g.*, flue gas, passes down a cooling tower and bubbles through an aq. solution in a tank underneath in which NH_4HCO_3 crystallises and is removed. The product, which contains small quantities of phenolic substances, is suitable for use as a fertiliser. L. A. Coles.

Preparation of ammonium sulphate crystals and apparatus therefor. H. Wade. From H. Koppers A.-G. (B.P. 361,935, 21.6.30).—An ammoniacal gas is introduced by nozzles below the surface of a pool of H_2SO_4 [or H_2SO_4 containing $(NH_4)_2SO_4$ solution] in a conical-bottomed saturator in such a way as to impart a rotary movement to the liquor. A mechanical stirrer, supported above the vessel, and driven through worm-gearing, assists the rotary movement and increases the degree of agitation independently of the amount of gas admitted. The particles of $(NH_4)_2SO_4$ are thereby kept in suspension long enough to achieve a predetermined magnitude of crystal growth. The stirrer is attached to a hollow, vertical shaft through which the deposited crystals can be drawn by a suction lift. A gas outlet is provided in the cover of the saturator. Modifications of the apparatus are described. F. Yeates.

Preparation of ammonium sulphate and nitrogen. D. Vorländer and A. Lainau (B.P. 360,489, 8.8.30. Ger., 21.8.29).—A catalyst for the atm. oxidation of $(NH_4)_2SO_3$ comprises a complex Co sulphito-ammine prepared, *e.g.*, by the action of O_2 and SO_2 on an aq. Co salt solution in the presence of NH_3 or $(NH_4)_2CO_3$. During the process the solution is kept at p_H 8—9, and the $(NH_4)_2SO_4$ formed is recovered by crystallisation, leaving a mother-liquor for re-use in the process or from which the Co may be pptd. as CoS for re-conversion into the catalyst. L. A. Coles.

Manufacture of sodium fluoride. E. Eckoldt (U.S.P. 1,809,476, 9.6.31. Appl., 18.7.27. Ger., 6.8.26).—A mixture of a material containing CaF_2 and SiO_2 is melted with K_2CO_3. The product is treated with H_2O, HF is added, and the SiO_2 filtered off, the solution being pptd. with Na_2CO_3, and the K_2CO_3 recovered by evaporation. W. J. Wright.

Production of potassium nitrate. Kali-Forschungs-Anstalt G.m.b.H., O. Kaselitz, and B. Uebler (B.P. 362,162, 5.12.30).—Vaporised HNO_3 or nitrous gases act on solid KCl at a temp. above the dew point of the vapours, the escaping gases being freed from Cl_2 in the usual manner and re-used. Oxides of N may be used, such oxides being produced from $Ca(NO_3)_2$ or other suitable nitrates by the action of the NOCl evolved during the conversion of the KCl into KNO_3. The cycle of operations is a closed one, and dry, neutral KNO_3 is directly produced. F. Yeates.

Cyanide recovery [from solutions used in treating auriferous etc. ores]. L. D. Mills and T. B. Crowe, Assrs. to Merrill Co. (U.S.P. 1,809,248, 9.6.31. Appl., 14.8.28).—The cyanide solution is acidified with SO_2 to ppt. metallic cyanide compounds, which are roasted to recover HCN, this being introduced into further cyanide solution before acidifying. The residue after roasting is oxidised to give SO_2 for use in pptg. W. J. Wright.

Production of alkali phosphates from compounds of metal and phosphorus. C. (Baron) von Girsewald, H. Weidmann, and G. Roesner, Assrs. to Amer. Lurgi Corp. (U.S.P. 1,807,766, 2.6.31. Appl., 5.5.30. Ger., 31.5.29).—Ferrophosphorus in granular or lump form is gradually introduced into fused alkali sulphate, an explosive reaction being thereby avoided. The product is lixiviated. W. J. Wright.

Working up crude phosphate and potassium salts to mixed fertiliser. C. T. Thorssell (U.S.P. 1,806,029, 19.5.31. Appl., 7.8.30. Ger., 14.8.29).—A solution containing $(NH_4)_2CO_3$ and NH_4Cl is treated with $CaSO_4$, $CaCO_3$ is removed, and the liquor is treated with (*a*) KCl and NH_3 to ppt. K_2SO_4, (*b*) sylvinite and NH_3 to ppt. a mixture of glaserite and KCl from which K_2SO_4 is recovered by washing with H_2O, or (*c*) sylvinite, H_2SO_4, and NH_3 to ppt. glaserite or a mixture of it with Na_2SO_4, the sulphates in each case being used in the decomp. of phosphates with HNO_3. The mother-liquors from (*a*) are cooled to remove part of the NH_4Cl and are then saturated with CO_2, and from (*b*) and (*c*) are used in the NH_3-soda process to yield liquors for re-use in the first stage of the process. L. A. Coles.

Manufacture of [anhydrous] chloride of lime. Soc. Elettrica ed Elettrochimica del Caffaro, A. Carughi, and C. Paoloni (B.P. 362,068, 30.9.30. It., 25.11.29. Addn. to B.P. 317,716; B., 1929, 851).—The product of the prior patent is freed from combined and free H_2O (1) by drying in a vac. with gradual rise in temp. from 40° to 90°, or (2) by boiling with CCl_4, separating the H_2O by gravity after condensation, returning the condensed CCl_4 continually to the boiling vessel until dehydration is substantially complete, and finally drying the product in a vac. F. Yeates.

Recovery of alkali-metal compounds [from sulphate-pulp "black-liquor"]. C. A. Grondona, Assr. to Peebles Processes, Inc. (U.S.P. 1,808,773, 9.6.31. Appl., 28.9.27).—"Black liquor" is sprayed into the upper portion of a furnace, where its combustion creates a heated zone. At a lower level further black liquor together with salt-cake is introduced, the radiated heat from the upper zone serving to promote partial combustion. The non-combustible solid residues from the upper zone and the unconsumed constituents from the lower zone fall to the bottom of the furnace, where they form a reduction bed for the salt. W. J. Wright.

Manufacture of cyanamide or like compounds containing nitrogen. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 360,621, 17.10.30. Addn. to B.P. 332,584; B., 1930, 946).—Zn carbamate or its double compound with NH_3 is heated at 350—500° (preferably 350—400°) in the presence of a non-reacting gas and the resulting mixture of Zn cyanamide and ZnO is treated with NH_4 carbamate, as described in the prior patent, to yield cyanamide or its conversion or polymerisation products and Zn carbamate for re-use in the process. L. A. Coles.

Preparation of base-exchange zeolite. F. M. Tschirner, Assr. to Zeolite Chem. Co. (U.S.P. 1,804,964, 12.5.31. Appl., 4.2.28).—Greensand is treated several times with boiling dil. H_3PO_4, the liquor being replaced after each treatment, and finally with boiling dil. $Na_2Al_2O_4$. L. A. Coles.

Manufacture of base-exchange material. A. S. Behrman, Assr. to Permutit Co. (U.S.P. 1,806,663, 26.5.31. Appl., 21.3.24).—The gel formed by the admixture of an alkali (Na) silicate, an acid (H_2SO_4), and a solution of a non-alkaline compound of an amphoteric hydroxide [$Al_2(SO_4)_3$] in proportions such as to yield a mixture alkaline to phenolphthalein and such that $SiO_2 : Na_2O : Al_2O_3 > 10 : 1 : 1$, is dried and then washed to remove sol. constituents. L. A. Coles.

Stabilisation of base-exchanging substances. C. C. L. G. Budde (B.P. 360,736, 5.1.31. Denm., 7.1.30). —The substances, with the exception of glauconite, are incorporated with insol. binding material such as cellulose hydrate or other cellulose derivatives; *e.g.*, the material is mixed with xanthate solution and, after this has been decomposed by heat or treatment with precipitants, the mass is washed, dried, and disintegrated. L. A. Coles.

Manufacture of mercury salts. H. S. Reid and A. H. Maude, Assrs. to Canadian Electro Products Co., Ltd. (U.S.P. 1,808,253, 2.6.31. Appl., 12.7.29. Cf. U.S.P. 1,721,188; B., 1929, 814).—Hg is brought into contact with a non-oxidising mineral acid, *e.g.*, H_2SO_4, of $<$ 60% concn., at 20—80°, in presence of HNO_3 as catalyst. O_2 is supplied to the reaction mixture to regenerate the HNO_3. W. J. Wright.

Manufacture of copper hydroxide. W. H. Furness, Assr. to Cellocilk Co. (U.S.P. 1,800,828, 14.4.31. Appl., 15.9.25).—A 25% solution of $CuSO_4,5H_2O$ is treated with sufficient aq. NH_3 to give a clear solution of $Cu(NH_3)_4SO_4$. This solution is treated with NaOH to ppt. $Cu(OH)_2$ and the filtrate is used again for the dissolution of $CuSO_4$. As Na_2SO_4 accumulates in the liquor, it is allowed to crystallise as $Na_2SO_4,10H_2O$ and the mother-liquor is used again in the circuit, occasional addition of aq. NH_3 being made to compensate for losses. A. R. Powell.

Transformation of the gas resulting from reduction of iron oxides obtained during manufacture of hydrogen by the iron–water vapour method. Soc. des Mines de Dourges (B.P. 360,750, 21.1.31. Fr., 28.2.30).—The Fe oxides are reduced at about 750° by, *e.g.*, coke-oven or coal gas, and the gas mixture formed is passed directly over coke at 1200° to yield a mixture comprising mainly CO, N_2, and H_2. L. A. Coles.

Manufacture of lead sulphates containing lead oxide [basic sulphates for use as pigments]. S. Negishi (B.P. 358,645, 7.8.30).—A fine powder consisting wholly or mainly of Pb_2O is injected by air, and SO_2 is passed simultaneously into a furnace heated by oil burners to about 700°; the product as it leaves the furnace is collected, *e.g.*, in bags for use as a pigment. (Cf. B.P. 358,644; B., 1932, 31.) L. A. Coles.

Recovery of tin compounds [from waste silk-weighting liquors]. G. Buttfield, Assr. to Vulcan Detinning Co. (U.S.P. 1,804,551, 12.5.31. Appl., 28.4.27).—The liquors flow through a float tank in which they are neutralised by the addition of a regulated supply of, *e.g.*, milk of lime and then flow into a tank in which the ppt. of hydrated SnO_2 settles out and is moved mechanically to an outlet at the bottom, whence it is conveyed to a spray dryer. L. A. Coles.

Production of oxy-compounds of tantalum and columbium from the ores. C. G. Fink and L. G. Jenness, Assrs. to Inter-Metal Corp. (U.S.P. 1,802,242, 21.4.31. Appl., 20.5.26).—The finely-ground ore is digested at 95—98° with a saturated solution of $H_2C_2O_4,2H_2O$ in 50% aq. HF. Hydrated Ta and Nb pentoxides are recovered from the resulting solution by fractional pptn. with aq. NH_3. A. R. Powell.

Manufacture of metal alkyl compounds. E. G. Britton, Assr. to Dow Chem. Co. (U.S.P. 1,805,756, 19.5.31. Appl., 16.11.26).—Et Mg halides, preferably prepared by adding EtBr and then EtCl to a suspension of Mg in a mixture of Me_2O and PhMe, are treated with $PbCl_2$ at first below 50° and then, after boiling off the Me_2O, at 90—95°; the product, after neutralisation with aq. HCl, filtration, and removal of the aq. layer, is distilled *in vacuo* to recover the $PbEt_4$. L. A. Coles.

Hydrogen-ion standard buffer solutions. S. F. Acree (B.P. 360,402, 24.4.30. U.S., 2.5.29).—The solutions, which are made up in "superpure" H_2O, p_H 7, prepared as described, contain Na H phthalate alone or together with other buffers, alkali carbonates and/or bicarbonates, a sterilising agent (thymol or CH_2O), and an indicator, preferably a sulphonephthalein, adjusted to the desired p_H val. L. A. Coles.

Production of mixtures of nitrogen and hydrogen from bituminous fuels. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 360,618, 15.10.30).—The fuel is subjected successively to low-temp. carbonisation and to complete gasification by means of steam and air by blowing the fuel, arranged in layers on grates one above the other in a vertical shaft, with the gasifying agent at a rate sufficient to bring the fuel into vigorous motion on its bed (cf. B.P. 343,435; B., 1931, 430). After separation of the condensible vapours the non-condensed gases are subjected to incomplete combustion with air and then to treatment with steam at 380—620° to convert the CO into CO_2, which is finally removed by known means. The resultant mixture of N_2 and H_2 may be used for the synthesis of NH_3. A. B. Manning.

Production of sulphur from hydrogen sulphide and sulphur dioxide. R. F. Bacon (U.S.P. 1,807,583, 2.6.31. Appl., 13.4.27).—The mixture of gases is subjected to violent agitation by means of a rotating paddle and to a pressure of 5—10 atm. W. J. Wright.

Sulphur sludge treatment. G. E. Seil, Assr. to Koppers Co. (U.S.P. 1,808,938, 9.6.31. Appl., 7.5.26).—Sol. material is first removed by treating the sludge on a filter with hot H_2O and steam at atm. pressure. The S is then separated from solid catalysts by treatment with steam alone at 120° and under 14—15 lb./sq. in. pressure and allowing the molten S to flow through the filter. W. J. Wright.

Composition for producing irritating smoke clouds. D. B. Bradner (U.S.P. 1,805,755, 19.5.31. Appl., 24.1.28).—The mixture contains (preferably equal wts. of) white P and chloroacetophenone. L. A. Coles.

Catalysts. Washing flue gases.—See I. **Waste cuprammonium liquors.**—See V. **Lime kilns.**—See IX. **Decomp. products of glass.**—See XI. **Zn-white. Lithopone. Ti pigments.**—See XIII. **Fertilisers. Manure mixtures.**—See XVI. **Fat-sol. Bi salts.**—See XX.

VIII.—GLASS; CERAMICS.

Etching of glass. W. S. Kahlson (J. Amer. Ceram. Soc., 1931, **14**, 827—832).—The mechanism of the action of a HF–NH_4F–NaF etching reagent is explained, and the behaviour of etching solution toward glasses of various compositions is described. No universal solution applicable to all glasses has been evolved. J. A. Sugden.

Apparatus for determining the annealing constants of glass. D. E. Sharp, J. Bailey, and I. Hyman (J. Amer. Ceram. Soc., 1931, **14**, 820—826).—A small strip of glass is subjected to a transverse bending stress while it is observed in polarised light through a system consisting of a lens, Nicol prism, and calibrated quartz wedge. The specimen is heated to a given temp. in a small tube furnace and the rate at which the strain is relieved (as measured by the movement of the black interference band) is measured. J. A. Sugden.

Thiosulphate titrations of small amounts of iron in glass sands. L. B. Skinner (Ind. Eng. Chem. [Anal.], 1931, **3**, 411—414).—Sand having a low content of Al_2O_3 is evaporated with HF in a Ag dish, the residue is fused with NaOH and $NaClO_3$, the melt lixiviated with H_2O, acidified with HCl and HNO_3, and boiled. the $Fe(OH)_3$ is pptd. by NH_3, dissolved in dil. HCl, and determined by KI and $Na_2S_2O_3$. When much Al_2O_3 is present $NaClO_3$ is omitted in the fusion, the melt is disintegrated in H_2O, Na_2S is added, the FeS is collected, dissolved, and oxidised, and $Fe(OH)_3$ is pptd. by NH_3 and treated as before. E. S. Hedges.

Weathering and iridescence of some ancient Roman glass found in Cyprus. A. W. Laubengayer (J. Amer. Ceram. Soc., 1931, **14**, 833—836).—The incrustation formed on the surface of glass buried in moist silt for 1800 years was examined spectroscopically and found to consist almost entirely of hydrated amorphous SiO_2 remaining after the hydrolytic removal of the alkalis. The iridescence is due to an interference effect of the thin films of incrustation. J. A. Sugden.

Measurement of the alkalinity of [medicinal] glasses. C. Stich (Pharm. Ztg., 1931, **76**, 1401; cf. A., 1930, 968).—Methods employed, based on the use of the methyl-red–HCl reagent, D.A.B. VI, are described. E. H. Sharples.

Natural-gas firing in the enamelling industry. F. Kainz (Chem.-Ztg., 1931, **55**, 846—848).—The temp. of the flame in enamel melting furnaces fired with natural gas mixed with air preheated at 800° is about 2100° and is therefore above the m.p. of the usual refractories. By mixing 3 vols. of cold air with 1 vol. of the gas and using preheated air in the burners the flame temp. is reduced to 1700°, which is sufficient for the fusion of any of the ordinary types of enamel. A similar result may be obtained by adding steam or by spraying H_2O into the flame. A. R. Powell.

***X*-Ray and microscopic studies of silicate melts containing ZrO_2.** H. B. Barlett (J. Amer. Ceram. Soc., 1931, **14**, 837—843).—Examination of the systems ZrO_2–SiO_2, ZrO_2–Al_2O_3–SiO_2, and the latter + fluxes, showed that (1) zircon when fused dissociates into ZrO_2 + a high-silica glass, which on annealing at 1400° reverts to ZrO_2,SiO_2; (2) cristobalite may form in fused ZrO_2,SiO_2; (3) ZrO_2,SiO_2 crystallises from melts containing MgO and CaO, but ZrO_2 from those containing Li_2O. Thus the fluxes will determine in what form the ZrO_2 is present in a body, regardless of how the ZrO_2 was introduced, if the body be fused. ZrO_2,SiO_2 in a normally fired body, however, will undergo very little change, but the introduction of fused ZrO_2,SiO_2 into a body may take with it some cristobalite. J. A. Sugden.

Treatment of clays to overcome drying defects (contd.). J. G. Phillips (Canada Dept. Mines Invest. Ceramics and Road Materials, 1928—9, No. 722, 46—55; cf. B., 1930, 863).—Certain clays which are too plastic to dry quickly without cracking were successfully treated by adding grog together with one or more coagulating chemicals (1% of $FeCl_3$ or 1% of $FeCl_3$ + 0·5% of NaCl) and also by preheating in a rotary kiln to 450—550°. Both methods have been operated successfully for some time on the plant scale. Further laboratory tests have shown that the cracking of clays with poor drying properties is due entirely to their low permeability to H_2O and that low permeability is not always associated with high drying shrinkage. J. A. Sugden.

Plant trials to overcome drying difficulties [in clay]. J. G. Phillips (Canada Dept. Mines Invest. Ceramics and Road Materials, 1928—9, No. 722, 56—57).—The addition of 1% of NaCl or 0·5% of CaO, or a mixture of the two, enables a clay used by the Montreal Terra Cotta Co. to be much more quickly dried and with decreased drying losses. The method has been successfully operated on the plant scale for some time. J. A. Sugden.

Production of grey brick. L. P. Colin (Canada Dept. Mines, Invest. Ceramics and Road Materials, 1928—9, No. 722, 22—23).—Although laboratory tests showed that good greys could be made by adding small amounts of MnO_2 and limestone dust to the light buff-burning clays of Ontario and Quebec, the results could not be repeated on the plant scale without adding uneconomical amounts of MnO_2. The vitrification ranges of these particular clays and shales are too short to make satisfactory brick by the addition of MnO_2. J. A. Sugden.

Ceramic bodies for electrical heating devices. L. P. Collin (Canada Dept. Mines, Invest. Ceramics and Road Materials, 1928—9, No. 722, 4—6).—Two series of bodies, one containing talc and the other magnesite, were both bonded with ball clay and china clay, fired, and tested for strength (impact test) and resistance to spalling (quenching test). Comparison with commercial bodies showed that the talc mixture was inferior, but the 30% magnesite mixture was highly resistant to spalling and rather low in strength, although sufficiently strong for practical needs. The body, however, has two defects, viz., high firing shrinkage and poor workability. Experiments are in progress to remove these defects by the use of higher forming pressures. J. A. Sugden.

Slagging of refractories. VI. Corrosive action and constitution of metallurgical slags. H. Salmang and J. Kaltenbach (Feuerfest, 1931, 7, 161—169; cf. B., 1931, 633).—The action of metallurgical oxides, binary, ternary, and quaternary silicates on fireclay bricks at 1320°, 1410°, and 1500° has been investigated. The corrosive action of oxides at 1410° decreases in the order Cu_2O, PbO, FeO, Sb_2O_5, Fe_2O_3, ZnO, SnO_2, and that of binary silicates increases in the order NiO, ZnO, PbO, Cu_2O. A mixture of SiO_2 and Sb_2O_5 simply forms a glassy mass on the surface of the brick, whilst SnO_2 and Cr_2O_3 do not react with SiO_2 at temp. below 1500°. Pb antimonates are corrosive, but their action decreases with increasing Sb_2O_5 content. Addition of various oxides to $2FeO,SiO_2$ and FeO,SiO_2 slags containing Fe_2O_3 in equilibrium proportions increases the corrosive nature to an extent which decreases with the oxide in the following order (equimol. additions): PbO, Cu_2O, BaO, CaO, SnO, FeO, NiO|Ni_2O_3, Al_2O_3, SiO_2, Fe_2O_3, ZnO, Sb_2O_5, SnO_2, Cr_2O_3; the oxides to the right of the line behave as acids and are arranged in ascending order of acidity. ZnO behaves as a base in neutral and acid slags, but as an acid in highly basic slags, whereas Al_2O_3 always behaves as an acid; its apparent behaviour as a base in some acid slags is ascribed to its action in promoting the dissociation of Fe_2O_3 into FeO, whereby the basicity of the slag is increased. Ni_2O_3 has been found in $2PbO,SiO_2$ slags to which NiO has been added; like Fe_2O_3 it is a feeble acid. A. R. Powell.

Substitution of andesite for acid-resisting ceramic ware. E. M. Khanin (J. Chem. Ind., Russia, 1929, 6, 1657—1660).

See also A., Dec., 1389, **Alloys for vac.-tight glass-metal joints.**

Patents.

Annealing lehrs. Lehrs for annealing glassware. Brit. Hartford-Fairmont Synd., Ltd., and T. Wardley (B.P. 360,447 and 360,825, 5.6.30).—Two methods are described by which the heat may be regulated transversely to secure uniformity, or varied to such an extent that materials needing different heat-treatment may be treated in the same tunnel. B. M. Venables.

Treatment of glass articles. R. D. Smith, Assr. to Corning Glass Works (U.S.P. 1,807,017, 26.5.31. Appl., 5.3.29. Renewed 6.4.31).—The "weathering" of, *e.g.*, frosted electric-light bulbs is prevented by washing the glass in a solution containing $\not> 750$ pts. of AlF_3 in 10^6 pts. of H_2O. L. A. Coles.

Manufacture of compound glass. Soc. des Usines Chim. Rhône-Poulenc (B.P. 361,254, 14.4.31. Fr., 30.1.30).—The sheet of plastic material is subjected for several hr. before assemblage to the action of a vac. to remove occluded gases and vapours. L. A. Coles.

Treatment of clay. W. R. Jeavons and M. J. Rentschler (U.S.P. 1,808,231, 2.6.31. Appl., 11.5.28).—Efflorescence on bricks or tiles, due to deposition of $MgSO_4$ and $CaSO_4$, is prevented by treating the clay with an aq. solution of $Ba(OH)_2$ maintained at 80° to expel CO_2. W. J. Wright.

Surface treatment of (A) synthetic precious stones, (B) articles made of synthetic corundum. H. Espig and W. Teubner, Assrs. to I. G. Farbenind. A.-G. (U.S.P. 1,806,588—9, 26.5.31. Appl., [A] 7.2.30. [B] 12.6.30. Ger., [A, B] 11.2.29).—(A) Artificial stones of the spinel or corundum type are dipped in $Na_2B_4O_7$ at 750—800°, cooled, and washed with H_2O. (B) Corundum articles, *e.g.*, insulators for sparking plugs, are dipped in a fused mixture of $Na_2B_4O_7$ and, *e.g.*, a little NaCl. In each case a smooth surface is obtained without grinding. L. A. Coles.

Manufacture of vitrified argillaceous products. W. B. Pine (Assee.), and J. B. and M. C. Shaw (U.S.P. 1,809,214—5, 9.6.31. Appl., [A] 16.7.30, [B] 4.11.29. Renewed [B] 21.3.31).—Clays and/or shales containing insufficient felspar and quartz to yield porcelain are heated, after a preliminary moulding, to partial fusion and in this condition are compressed, *e.g.*, by passage through rollers. L. A. Coles.

Manufacture of [abrasive] compositions comprising ceramic-bonded alumina granules. Norton Co. (B.P. 361,167, 29.12.30. U.S., 8.3.30).—A vitrified ceramic bond which matures above redness and below Orton cone 13 comprises clay material containing $<1\%$ of Fe_2O_3, at least 10% of Al_2O_3, and at least 13% of metal oxides forming the flux; *e.g.*, a suitable mixture contains 31% of Kentucky No. 5 ball-clay, 52% of Maine felspar, 8% of flint, 6% of whiting, and 3% of MgO. L. A. Coles.

Production of refractories. Verein. Stahlwerke A.-G. (B.P. 360,572, 19.9.30. Ger., 27.9.29).—Magnesite or dolomite precalcined at $>1500°$ is mixed with comminuted chrome ore and pressed to shape either with or without an org. binder. The brick, containing 10—80% MgO, is then burned similarly to SiO_2 brick. C. A. King.

Manufacture of refractory materials. W. W. Triggs. From Chamottefabr. Thonberg A.-G. (B.P. 361,286 and Addn. B.P. 361,290, 16.7.30).—Mixtures of (a) ground fireclay and felspar or dolomite, or (b) ground quartz and dolomite, both with waste sulphite lye as binder, are shaped under compression and fired at 1300—1400°. L. A. Coles.

Forming refractory articles [containing zircon]. J. D. Morgan, Assr. to Doherty Research Co. (U.S.P. 1,807,543 and 1,809,249, [a] 26.5.31, [b] 9.6.31. Appl., [a] 21.6.26, [b] 15.10.28).—The articles are prepared by firing mixtures of (a) zircon (Zr silicate) and sufficient $BaCO_3$ to yield a product containing 0·1—1·5% BaO, or (b), *e.g.*, 82 pts. of ZrO_2, 9 pts. of milled zircon, and sufficient H_3PO_4 to yield 9 pts. of P_2O_5. L. A. Coles.

Manufacture of bricks or shapes [of fireclay or shale]. J. G. Stein & Co., and J. F. Hyslop (B.P. 361,166, 29.12.30).—The raw material is precalcined at about 700°, to remove C, S, and H_2O, compounded with plastic clay, moulded, and fired at 1100—1600°. C. A. King.

Manufacture of abrasive articles. Carborundum Co., Ltd. (B.P. 360,482, 7.8.30. U.S., 8.8.29).—A mixture prepared from abrasive particles, a filler, a protective colloid, and vulcanising material in a dispersion of rubber is dried to a moisture content of 5—7%, granulated, and further dried to room temp. Abrasive blocks may be moulded by heating the mixture under moderate pressure and then applying high pressure before vulcanising is completed. C. A. King.

Manufacture of sheet glass by rolling. Soc. Anon. des Manuf. des Glaces et Prod. Chim. de St.-Gobain, Chauny et Cirey, Assees. of L. N. Pond (B.P. 361,839, 24.7.30. U.S., 25.7.29).

Adhesive.—See XV.

IX.—BUILDING MATERIALS.

Portland cement from gypsum.—See VII.

See also A., Dec., 1370, **Ca aluminates.** 1373, **System CaO-FeO in Portland cement.** 1380, **Pressure synthesis of Ca silicates.**

Patents.

Lime kiln. E. T. Reed (U.S.P. 1,805,151, 12.5.31. Appl., 4.12.29).—In a fire chamber adjacent to the base of a lime kiln, holes are provided for directly poking the CaO through the "fire eyes" and air and steam pipes are arranged to deflect the flow of hot gases away from the poking apertures. C. A. King.

Lime kiln. W. J. Kuntz (U.S.P. 1,808,851, 9.6.31. Appl., 9.7.27).—A shaft lime kiln discharges into a truncated form of cooler around which **L**-shaped members form a water-jacket from which the steam generated is conveyed to the combustion chamber of the kiln. C. A. King.

Rotary kilns for burning cement, lime, and similar [slurry] materials. G. & T. Earle, Ltd., and F. W. Davis (B.P. 360,467, 6.8.30).—A number of louvre-like baffles are placed in the upper end of the kiln, and these become coated with slurry, promote evaporation, and absorb dust produced further down the kiln. If it is possible to enlarge the end of the kiln a central disc should be provided to cause the gases to pass through an annular space subdivided by the louvres. B. M. Venables.

Production of Portland cement. E. W. Reed-Lewis, Assr. to Super Cement Co. (U.S.P. 1,805,104, 12.5.31. Appl., 11.8.27).—Pulverised cement clinker is mixed with gypsum which has been pretreated with tannic acid, and sufficient active SiO_2 is added to combine with the CaO liberated by the hydration of the cement. C. A. King.

Manufacture of cement. Associated Portland Cement Manufrs., Ltd. (B.P. 361,370, 12.8.30. Austral., 26.8.29).—Coal, coke, charcoal, or shale, either separately or mixed, is added during the grinding of cement clinker to reduce heating and clogging. [Stat. ref.] C. A. King.

Cement composition. P. Zucco (U.S.P. 1,803,582, 5.5.31. Appl., 6.10.25).—Granulated basic slag obtained in the smelting of Fe_2O_3 ores is intimately ground with a fused Ca aluminate to give a mixture containing 60% of $3Al_2O_3,5CaO$ and 30% of $2CaO,SiO_2$. A. R. Powell.

Hydraulic cement-concrete and mortar. C. A. Newhall (U.S.P. 1,802,667, 28.4.31. Appl., 1.2.26).—A mixture of 90% of Portland cement, 2% of Al powder, and 8% of finely-ground ferrosilicon is claimed. During setting, the $Ca(OH)_2$ reacts with the metals to form H_2 which renders the mass porous. A. R. Powell.

Coloured cement, cement-concrete, and like materials. E. B. Higgins (B.P. 361,570, 4.11.30).—A dye formed by the interaction (*in situ*) of a diazotised arylamine with a 2 : 3-hydroxynaphthoic arylide is used as the colouring agent C. A. King.

Accelerating the hardening of plastic materials [concrete, cement, etc.]. A. Brund and H. Bohlin (U.S.P. 1,808,762, 9.6.31. Appl., 16.4.30. Ger., 5.4.28).—An alternating current is passed through the material. L. A. Coles.

Mortars, concretes, and the like. Chem. Fabr. Grünau, Landshoff & Meyer A.-G. (B.P. 361,094, 4.11.30. Ger., 13.5.30).—Albumin products or other colloids are added to a cement mixture and the tendency to produce a froth is prevented by incorporating $<1\%$ of a salt of a higher fatty acid, *e.g.*, alkali ricinoleate, or its sulphonated product. C. A. King.

Apparatus for production of light aggregates. H. H. Smith, Assr. to Industrial Silica Corp. (U.S.P. 1,805,020, 12.5.31. Appl., 14.5.30).—SiO_2 gravel is crushed, mixed with an Fe compound and a flux, and conveyed on a belt through an oil bath to coat the particles. The material is then heated to carbonise the oil and reduce the Fe, which forms a honeycombed network of crystals as a bond. C. A. King.

Making a foamy body [cellular concrete]. J. A. Rice, Assr. to Bubblestone Co. (U.S.P. 1,807,810, 2.6.31. Appl., 26.7.24).—To produce the foam solutions of proteins, starch, etc. and an alkali soap (*e.g.*, rosin soap) are suitable; $CaCl_2$, $AlCl_3$, acids, cellulose derivatives, CH_2O, etc. may also be added. L. A. Coles.

Production of artificial stone. J. B. Bossi and P. A. Mazzuchelli, Assrs. to Cambridge Cement Stone Co. (U.S.P. 1,809,329, 9.6.31. Appl., 11.9.29).—One or more faces of a mould are bespattered with a paste composed of water and a waste powder, *e.g.*, particles from sawing or grinding of artificial stone blocks, and the cement mixture is then cast. When the block is set the paste is washed away and an irregular texture of the stone is produced. C. A. King.

Manufacture of artificial stone. G. Brighenti (B.P. 361,734, 11.2.31. Fr., 12.2.30).—A mixture of sand and cement is tempered with a solution of $FeCl_3$ and the moulded material is dried at a gradually rising temp. Finally the block is immersed in molten S, and the hardness and strength is comparable with that of natural granite. C. A. King.

Production of artificial marble. E. Revelant, G. Sormani, and G. Barone (B.P. 360,135, 26.9.30. Ger., 4.1.30).—Comparatively large pieces of calcareous material, *e.g.*, stalactites or stalagmites, with only a small proportion of small pieces, are cast in a mould with cement and the partly seasoned block is sawn into plates. The sawn surfaces are impregnated with a solution of Mg fluosilicate and polished. C. A. King.

Plaster ovens of the type in which the gypsum is in direct contact with the hot gases employed for baking. A. Bourdet (B.P. 359,900, 25.7.30. Belg., 19.12.29).—Gypsum is fed by mechanical screws through two superimposed rotary tubes in sequence, the gas outlets of which discharge into dust-removing chambers. The temp. of the hot gases travelling in the same direction as the gypsum is much higher in the upper tube than in the lower one in which the gases flow countercurrent-wise. C. A. King.

Manufacture of acoustical material. W. W. Triggs. From United States Gypsum Co. (B.P. 359,996, 23.6.30).—A mineral fibrous material, *e.g.*, "granulated mineral wool," is mixed with a binder, a plasticiser, and a waterproofing agent, and the surface of the dried block is ground to expose the porous interior. Suitable proportions for 56 lb. of mineral wool are starch 5½ lb., Karaya gum 1¼ lb., colouring matter 10 oz., mineral filler 3 lb., preservative (β-naphthol) ½ oz., $CuSO_4$ 8 oz., blood-albumin 1 lb. C. A. King.

[Acoustical] building material. F. Payne, Assr. to Western Brick Co. (U.S.P. 1,808,905, 9.6.31. Appl., 28.5.28).—Blocks are made of burnt shale bonded with cement and cut surfaces are exposed. The shale should constitute the major portion of the total surface. C. A. King.

Manufacture of bituminous road materials. C. A. Agthe (B.P. 361,084, 27.10.30. Ger., 2.12.29. Addn. to B.P. 358,974; cf. B., 1932, 26).—In addition to volatile diluents a bituminous prep. contains a diluent which is wholly or partly H_2O-sol., *e.g.*, pyridine, and will disappear slowly either by volatilisation or decomp. Tar fractions containing cresols or phenols are excluded. C. A. King.

Treatment of road surfaces to remove slipperiness. Berry, Wiggins & Co., Ltd., and A. J. Smith (B.P. 360,243, 13.12.30).—Stone or slag chippings heated to 150—250° are rolled into the surface of a road which has been laid previously with a bituminous binder. C. A. King.

Wood product. [Impregnation of uncut trees.] C. B. Lipman and A. Gordon, Assrs. to Regents of University of California (U.S.P. 1,805,550, 19.5.31. Appl., 5.11.27).—The tree is impregnated with toxic and fixing agents, *e.g.*, a solution in aq. NH_3 of $Cu(OH)_2$. L. A. Coles.

Manufacture of fireproofed wood and like cellular products. R. H. McKee (U.S.P.. 1,804,633, 12.5.31. Appl., 9.1.28).—Wood is treated with approx. 40% aq. $(NH_4)_3PO_4$ and sufficient NH_3 to give p_H 8·5. L. A. Coles.

Waterproof and dielectric asbestos lumber. E. J. Buczkowski, Assr. to Ambler Asbestos Shingle & Sheathing Co. (U.S.P. 1,804,740, 12.5.31. Appl., 5.2.30).—A mixture of asbestos fibres, hydraulic cement, and previously emulsified asphaltic material is compressed into slabs, which are then dried and cured. L. A. Coles.

Uniting wood and other surfaces. C. Arnold. From I. F. Laucks, Inc. (B.P. 359,922, 28.4.30).—After the surfaces of wood to be joined have been treated with an adhesive of the oleaginous seed-flour type, the pieces are heated directly or by radiant heat prior to pressing together. C. A. King.

Manufacture of road-building materials. S. S. Sadtler (B.P. 359,924, 28.5.30. U.S., 28.6.29. Addn. to B.P. 357,603; B., 1931, 1096).—See U.S.P. 1,758,914; B., 1931, 679.

[Wooden] floor, wall, and ceiling coverings and the like. A. S. Lewenstein (B.P. 361,320, 13.8.30).

Separating dust from kilns etc.—See I. **Clay. Argillaceous products.**—See VIII. **Adhesive.**—See XV.

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

Roasting of spathic iron ore in externally fired shaft furnaces. E. Vogel (Stahl u. Eisen, 1931, 51, 1504—1505).—Roasting is carried out by passing a stream of hot gases containing an excess of air into the middle of a shaft down which the ore is allowed to fall. The furnace is constricted below the tuyère zone and the roasted ore is cooled in the narrow part by passing a current of cold air upwards from the discharge outlet; this air is conducted just above the constriction into flues by means of which it is led into the flues supplying the hot gases. The fuel consumption is the lower the lower is the temp. at which the ore is discharged from the furnace and the more complete the oxidation in the roasting zone; hence a large excess of cooling air should be used. The relations between fuel consumption, vol. of cooling air, and vol. of flue gas are shown graphically for various discharge temp. A. R. Powell.

Sintering of minette flue dust and fine ore. R. Baake (Stahl u. Eisen, 1931, 51, 1277—1283, 1314—1318).—Flue dust from blast furnaces smelting minette can be readily sintered on a Dwight–Lloyd grate if care be taken to get the correct moisture and coke content in the charge. The fine ore (<5 mm.) can also be readily sintered, and by screening out the fines from the blast-furnace charge, sintering, and returning the sinter to the furnace the amount of flue dust formed can be reduced from 35 to about 6% of the wt. of pig Fe produced. Typical sinter charges made up from calcareous and silicious minette fines, flue dust, material ejected from the converter, and 7—18% of coke fines are given in tables, together with details of the quality of the sinter produced; results obtained in an experimental grate holding 30 kg. were comparable with those obtained on a full-sized grate. A. R. Powell.

Mechanical properties of cast-iron rolls. F. Scharffenberg (Stahl u. Eisen, 1931, **51**, 1249—1256).—Separate tensile test pieces cast at the same time as the rolls give results for the mechanical properties which are not representative of the quality of the rolls since the tensile strength of a roll is not const. throughout the casting. The tests should therefore be made on one casting out of a batch; tensile tests at high temp. give the best indication of the behaviour of cast-Fe rolls in hot-rolling. There appears to be no exact relation between the strength of a casting and the quantity, distribution, or shape of the graphite inclusions. Tests on numerous types of hard rolls show that the ball-hardness of the outer hard layer is roughly inversely proportional to the tensile strength and to the bending strength. The tensile strength is the greater the finer is the grain size. A. R. Powell.

Peculiarities in the dissolution of steel in acids. K. Daeves, E. H. Schulz, and R. Stenkhoff (Stahl u. Eisen, 1931, **51**, 1397—1402).—The rate of dissolution of steel turnings in acids is independent of the content of Mn, S, P, Si, or C, but is considerably reduced by increasing the Cu content. On the other hand, Thomas steel dissolves much more rapidly than open-hearth steel, probably owing to the slightly more brittle character of the Thomas-steel turnings, giving them a rougher surface and producing in them minute cracks into which the acid penetrates. Tests on Thomas steels from numerous steelworks show that the rate of dissolution in conc. HCl is fairly const., whereas the rate for open-hearth steels varies over a wide range according to the works in which it is produced. Annealed and cold-worked open-hearth steels dissolve more rapidly than hardened steels. A. R. Powell.

Hot-hardness and stability on annealing of high-speed tool steel. F. Rapatz and H. Kallen (Stahl u. Eisen, 1931, **51**, 1339—1340).—The hardness of high-speed tool steels containing 0·7% C, 4% Cr, 1—2% V, 0—18% Co, and 13—21% W decreases slowly with rise of temp. up to 400°, then much more rapidly between 400° and 700°. The martensitic structure obtained by quenching from 1300° is the more stable the higher is the proportion of alloying elements in the steel; thus a steel of the above type containing 18·4% Co and 18·5% W retains its initial hardness for 30 min. at 600° and its martensitic structure for at least 15 hr., whereas a similar steel containing 15·2% W and no Co begins to soften immediately at 600° with fairly rapid decomp. of the martensite. At 550—600° the more highly alloyed steels retain their hardness for long periods and have a higher initial hardness than steels with a lower alloy content. A. R. Powell.

Methods of high-temperature treatment [of metals]. P. P. Cioffi (J. Franklin Inst., 1931, **212**, 602—612).—Four types of furnace are described which are suitable for use in work on the magnetic properties of Fe (A., 1930, 1242). The methods of heat-treatment were as follows: (1) Wires and tapes were heated to just below the m.p., by passing currents through them in the presence of a gas under pressure (1 atm. or less up to 20 atm.), while enclosed in special glass or steel containers. (2) Small toroidal specimens were heated by means of induced high-frequency current produced by means of a vac.-tube oscillator. The temp. could be accurately controlled over the range 1000—1500°, and the pressure adjusted between 1 atm. and 10^{-8} mm. (read on an ionisation manometer). (3) Irregularly shaped or large specimens were annealed in a vac. or under pressure of H_2 in a Mo-wound furnace capable of reaching 1700°. E. H. Bucknall.

Magnetic sands. I. Factors affecting rate of reduction of titaniferous magnetic sands. K. Iwasé, M. Fukusima, Y. Saitô, and S. Mitsukuri. **II. Effect of silicious matter on reduction of magnetic sand.** K. Iwasé, M. Fukusima, and S. Mitsukuri. **III. Roasting of magnetic sand and its subsequent reduction.** K. Iwasé, M. Fukusima, M. Kobayasi, and S. Mitsukuri (Sci. Rep. Tôhoku, 1931, **20**, 489—521, 522—535, 536—559).—I. Comparative experiments have been made of the ease of reduction of 3 kinds of titaniferous magnetic sand (0·5—42% TiO_2) and of ordinary Fe ores by CO and by various forms of C at temp. between 800° and 1050°. The ease of reduction of the magnetic sands diminishes with increase of the ilmenite content, and is much less than that of hæmatite and magnetite, but rather greater than that of plate slag. The efficacy of the various forms of C used falls in the order charcoal, semi-coke, active C, lampblack, coke, graphite. The influence of the particle sizes of the ore and the C, the TiO_2 content, the proportions of the reacting mixture, and the temp. have been studied in detail. The application of the results obtained to the reduction of ordinary Fe ores is indicated.

II. The presence of SiO_2 retards the reduction of magnetic sand by coke, owing partly to its preventing close contact between the reactants and partly to the occurrence of sintering. The former influence can be nullified by working at a higher temp.; trouble from sintering arises chiefly at high temp. and with easily reducible ores (hæmatite), and is due to the formation of difficultly reducible Fe silicate. Complete reduction may be effected at temp. below 1150°, but unless there is only a little SiO_2 present there is no great advantage in operating at temp. above 1000°. It is desirable that as much of the SiO_2 as possible should be removed mechanically, and if the finely-ground ore be briquetted by sintering with SiO_2 complete reduction may be effected at temp. below 1100°.

III. Complete oxidation (to $Fe^{\cdot\cdot\cdot}$) of magnetic sand by roasting at 700—1100° is more difficult than is complete reduction to metal and is more largely influenced by the particle size of the ore. Sands containing a high proportion of ilmenite are the most easily oxidised, but the advantage of roasting to render the reduction less difficult is most pronounced with the difficultly-reducible sands. H. F. Gillbe.

Faraday's "steel and alloys." (Sir) R. Hadfield (Phil. Trans., 1931, A, **230**, 221—292).—The chemical analysis, microstructure, and physical and mechanical properties of representative specimens of 79 small buttons of "steel" left by Faraday have been determined. The specimens contained one or more of the following metals: Cu, Cr, Au, Ir, Ni, Pt, Rh, Ag, and Mn (traces only), and many had a Brinell hardness above 600, indicating that they had been heat-treated. Experiments on forging and heat treatment on several Pt, Rh, Au, and Au–Ni steels indicated that Pt steels are readily converted into knife blades having a good cutting edge. A. R. Powell.

Age-hardening of magnesium alloys. S. Hashimoto (J. Study Met., 1930, **7**, 371—378).—Mg–Al and –Zn alloys showed an ageing effect; Mg–Ni, –Cu, –Sb, and –Ag or ternary alloys did not. Chemical Abstracts.

Artificial ageing of light aluminium alloys as a means of improving their mechanical properties. N. A. Saposchnikov (Trans. II Conf. Non-Ferrous Met., U.S.S.R., 1927, **1**, 598—609).—Tests with Al–Cu (2—5%; opt. 3%) alloys are described. Chemical Abstracts.

Inverse segregation [in alloys]. K. Iokibe (Sci. Rep. Tôhoku, 1931, **20**, 608—648).—Inverse segregation in Zn–Sn alloys is ascribed to outward movement of the liquid portion as a result of solidification shrinkage of the crystals formed in the outer portions of the crystal; this movement increases the Sn content of the outer portion, and by reducing the quantity of the eutectic mixture at the centre causes there an increase of the Zn content. H. F. Gillbe.

Shrinkage on solidification of alloys of manganese, nickel, and cobalt with carbon. K. Honda, Y. Matuyama, and T. Isobé (Sci. Rep. Tôhoku, 1931, **20**, 594—598).—Mn (99·9%) contracts by 4·50% on solidification, but addition of 1·1% of C reduces the contraction to 1·60%. The Ni–C eutectic (2·23% C) expands by 2·06%, and the Co–C eutectic (2·20% C) by 2·03%. H. F. Gillbe.

Platinum. D. McDonald (S.C.I. Chem. Eng. Group, Nov., 1931, 14 pp.).—The history, occurrence, metallurgy, properties, and uses of Pt are reviewed and an account is given of recent developments in Pt plating. A. R. Powell.

Lead and lead-antimony anodes for chromium plating. E. M. Baker and P. J. Merkus (Trans. Amer. Electrochem. Soc., 1932, **61**, 23—29).—In continuous plating from 2·5*M*-CrO_3, 0·05*N*-H_2SO_4 the loss in wt. per amp.-hr. of Pb–Sb anodes increases linearly with % Sb, but in intermittent plating there is a linear decrease if the ratio of plating time to idle time is $<$about 3, and the slope of this line increases with decrease in the time ratio. The equilibrium ratio, Cr^{VI}/Cr^{III}, in the bath appears to be unaffected by % Sb (0—12) in the anodes. H. J. T. Ellingham.

Chemical colouring of cadmium plate. H. Krause (Chem.-Ztg., 1931, **55**, 845—846, 862—864).—An adherent black film on Cd-plated articles to produce an "oxidised silver" finish may be obtained by immersing them in a hot solution containing 60 g. of $KClO_3$ and 5—8 g. of $CuCl_2$ per litre or in a cold solution containing 60 g. of $KClO_3$ and 35—40 g. of $Cu(NO_3)_2$ per litre to which a little basic $CuCO_3$ has been added to neutralise any free acid. A similar finish is produced by immersion at 60—80° in a solution containing 30 g. of $Cu(NO_3)_2$ and 2·5 g. of $KMnO_4$ per litre. Various shades of brown are produced by boiling the articles for 10—20 min. in a solution containing 160 g. of $KMnO_4$ and 60—250 g. of $Cd(NO_3)_2$ per litre; addition of $FeCl_3$ to this solution produces dark brown tones. A. R. Powell.

Barrel plating with zinc–cadmium alloys. L. E. Stout and I. Kowarsky (Metal Ind., N.Y., 1931, **29**, 297—299).—A solution containing CdO 3·7, NaCN 9·7, $Zn(CN)_2$ 0·8, NaOH 1·1 oz. per gal. gave bright deposits containing about 63% Zn (40% cathode efficiency at 25—80 amp. per sq. ft.); CdO 5·1, NaCN 9·7, $Zn(CN)_2$ 0·1, NaOH 1·1 oz. per gal. gave a corrosion-resistant alloy (Zn 15—20%). Chemical Abstracts.

Electrodeposition of iron, copper, and nickel alloys from cyanide solution. II. L. E. Stout and C. L. Faust (Trans. Amer. Electrochem. Soc., 1932, **61**, 1—22).—Relations observed in the deposition of binary and ternary alloys of Fe, Cu, and Ni (B., 1930, 668; 1932, 66) are interpreted qualitatively in terms of probable ionic equilibria in the cyanide-tartrate solutions, the anodic pptn. of ferrocyanides, and the mutually dependent H- and metal-overvoltages at the cathode. From the properties of the solutions and from experiments with other types of solution it is concluded that deposition occurs from complex cyanide and not complex tartrate ions. H. J. T. Ellingham.

Ni baths.—See XI. **Corrosion and paint.**—See XIII.

See also A., Dec., 1355, **Bi-black.** 1364, **Zn–Mn, Cu–Al, Cu–Au, Sn–Sb, Ag–Cu–Mn, and Cr–Ni alloys. Magnetic Pt alloys. Non-ferrous (Cu–Si) alloys.** 1369, **System Fe–O.** 1371, **Ag–Au. Anodal polarisation of Pt. Cu deposition.** 1374, **Topochemistry of corrosion.** 1377, **Ti, U, and V amalgams. Electrodeposited metal foils. Prep. of β-W.** 1380, **Pure Mg.** 1385, **Spectral analysis of Pb alloys. Determination of Mn and** (1386) **Co, Ti, W, traces of Sb in Cu, and Bi.** 1389, **Alloys for vac.-tight glass-metal joints.** 1390, **Fe ores of Donetz basin.**

Patents.

Metallurgical furnaces [for zinc reduction]. New Jersey Zinc Co., Assees. of (a, b) E. H. Bunce and G. T. Mahler, and (b) C. J. Lentz (B.P. 361,605—6, 20.11.30. U.S., 23.1.30).—(a) Vapour from a Zn retort passes through an upright conduit containing suitable agglomerate for collecting Pb, and then forward to a condensing chamber. The Pb eliminator is situated either on or close to the top of the retort chamber and is provided with doors for removing the spent material. (b) The Pb eliminator is supported directly above but independently of the retort to reduce expansional stresses in the former. A continuous column of agglomerate progresses by gravity through the eliminator and the retort. C. A. King.

Reverberatory furnace. W. F. Sklenar, A. H. Ronan, and British Reverberatory Furnaces, Ltd. (B.P. 360,855, 11.8.30).—A rocking reverberatory furnace has a bed of semicylindrical form and a downwardly directed burner nozzle fixed at the axis of oscillation. The short vertical flue is covered by a hood connecting with a chimney, and both the metal charge and air for combustion are preheated in the hood. C. A. King.

Roasting furnace. E. J. Fowler and D. Baird, Assrs. to Nichols Copper Co. (U.S.P. 1,805,659, 19.5.31. Appl., 24.1.28).—In a rotary-hearth furnace the vertical shaft is capable of extension and the rabble arm carries a tube on which the rabble teeth are fixed. This tube may be made rigid to or released from the rabble arm as desired. C. A. King.

Fine-cleaning of gases from roasting furnaces. Lodge-Cottrell, Ltd. From Metallges. A.-G. (B.P. 361,265, 11.5.31).—Gases after drying by contact with H_2SO_4 pass through a plant in which entrained liquid particles are entrapped; the plant is operated as an electrical precipitator which may serve to replace, wholly or in part, the electrical fine-cleaning preceding the drying process. J. S. G. Thomas.

Control of blast furnaces. J. F. Austin and D. H. McIntosh, Assrs. to Amer. Smelting & Refining Co. (U.S.P. 1,809,326, 9.6.31. Appl., 20.12.28).—Gas samples are withdrawn at frequent intervals from a suitable position in the interior of a blast furnace and alterations are made in the charge according to the results of the gas analyses. C. A. King.

Smelter. O. Potter, Assr. to G. M. Bard (U.S.P. 1,805,554, 19.5.31. Appl., 18.2.29. Renewed 6.10.30). —The chimney duct of a smelting furnace having a normally closed top extends up one side of the furnace with an air duct to the furnace alongside for the purpose of heat exchange. C. A. King.

Annealing furnace. P. A. Meehan, Assr. to Swindell-Dressler Corp. (U.S.P. 1,808,000, 2.6.31. Appl., 23.8.28).—Trays carrying the metal to be annealed and the metal cover rest on balls or rollers in a groove on the cover plate of the carrying truck. The boxes are filled with and maintained full of inert gases which are conveyed by means of pipes (valve-controlled) from pits under each end of the kiln. C. A. King.

Furnaces for annealing, normalising, or other heat-treatment of plate, sheet, or strip metal. A. Carpmael. From Amer. Rolling Mill Co. (B.P. 361,502, 27.9.30).—Metal sheets in a furnace are supported on rollers which consist of bare tubes closed at one end and cooled by a flow of water through an inner tube extending almost up to the closed end. The water returns along the space between the feed and the roller tubes. C. A. King.

Treating sulphide materials [ores, mattes, etc.]. S. I. Levy and W. S. Millar (B.P. 359,568, 26.7.30).—The sulphide material is passed through a furnace, in the same direction as a current of Cl_2, under such conditions that at least 75% of the ore is chlorinated without fusion of the resulting chlorides taking place. The product is passed to a second furnace in which it travels countercurrent to a stream of the hot gases from the first furnace, so as to complete the chlorination. The gases from the second furnace have a high S content, but are almost free from Cl_2. A. R. Powell.

Treatment of molten slag and like material. Ash Co. (London), Ltd., and P. B. Silk (B.P. 359,405, 15.7.30).—Molten slag is subjected to the intermittent action of high-pressure water jets, which serve to cut the slag stream into predetermined lengths which are partially cooled and broken into large pieces; the latter are then cooled by means of a stream of low-pressure water. A. R. Powell.

Treatment of furnace slag. L. von Reiche and L. Giersbach (B.P. 361,139, 3.12.30).—Dry, porous slag is formed by feeding molten slag and a regulated flow of water into a groove around the periphery of a wheel, the speed of rotation of which may be controlled. The groove may be fitted with cross-ribs, but should not be of sufficient height to form separate slag compartments. C. A. King.

Production of metal castings. R. W. Bailey (B.P. 360,980, 15.8.30).—During the casting process a metal of lower m.p. is introduced to fill the contraction space between the cast metal and the mould. When casting a large steel ingot, Pb is admitted near the bottom of the mould and the level is maintained to balance the hydrostatic pressure of the still liquid steel. The Pb may be run out before removing the ingot. C. A. King.

Casting of metal [steel]. E. C. Smith, Assr. to Republic Steel Corp. (U.S.P. 1,802,582, 28.4.31. Appl., 26.11.27).—Pb or a flouride having a b.p. below the m.p. of steel is added to molten steel in the ladle or ingot mould so as to cool the centre of the casting by its evaporation. A. R. Powell.

Casting metals [steels] and apparatus therefor. E. Bornand and H. A. Schlaepfer (B.P. 361,748, 20.2.31. Switz., 26.8.30).—A MgO cylinder with a graphite core is inserted into the upper part of the mould and a current is passed between the molten steel and the graphite, so that heat is generated by resistance in the MgO; in this way the rate of solidification of the steel is retarded at the top of the ingot and thus the piping is reduced. A. R. Powell.

Corrosion-resisting steel and iron. Verein. Stahlwerke A.-G. (B.P. 360,905 and 360,926, 7.5.30. Ger., [a, b] 11.5.29).—Steel or cast Fe resistant to sea-water and moist earth contains (a) 0·05—5% of Sb, Sn, As, Mg, and Al, either alone or in any combination, together with up to 1% Cu and any of the usual quantities of S, P, Si, C, and Mn, with or without 0·2—1% Ni, or (b) 0·1—1% Cu, 0·1—2% Ni, 0·05—5% Mg, and 0·05—5% Al, either separately, together, or in any desired combination. [Stat. ref. to (b).] A. R. Powell.

[Case-]hardening of steel and its alloys. SOC. D'EXPLOIT. DES PROC. MAHOUX, Assees. of A. P. MAHOUX (B.P. 360,833, 5.8.30. Fr., 8.8.29).—Steel articles are enclosed in a metal (*e.g.*, steel) container embedded in a sand-bath or a bath of molten Pb at 500—520°, and a current of NH_3 and/or a carbonaceous gas is passed through the container while an oscillatory electric field is produced between the metal being hardened and the container, which act as an electric condenser with the gas as dielectric. A. R. POWELL.

Annealing and heat-treating cast iron. P. S. MENOUGH (U.S.P. 1,803,340, 5.5.31. Appl., 10.11.25. Renewed 18.11.29).—White cast Fe is annealed at a temp. above the crit. range until the combined C has fallen to 0·25—1%, quenched to obtain a martensitic structure, and reheated at below the crit. range until a troostitic, sorbitic, or pearlitic structure is obtained. A. R. POWELL.

Heat-treatment of magnetisable metal. HEVI-DUTY ELECTRIC CO., Assees. of E. L. SMALLEY (B.P. 360,552, 2.9.30. U.S., 3.9.29).—In a continuous furnace the metal articles are carried through the heating zone on a conveyor belt actuated by an electric motor. The article in the heat-treatment position is influenced by lines of force from a magnetic circuit, and the loss of magnetic properties is utilised to cause the automatic movement to bring the next article into position. C. A. KING.

Bronzing of iron and steel. V. ROSSO (B.P. 361,095, 6.11.30).—The articles are immersed for 5—10 min. at 135° in a bath consisting of 44% H_2O, 36% NaOH, 10% PbO, 2·83% KCN, 1·55% $FeSO_4$, 5·6% $PbSO_4$, and 0·02% MnO_2. A. R. POWELL.

Treatment [calorising] of metals. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of J. G. E. WRIGHT (B.P. 359,250, 15.11.30. U.S., 16.11.29).—The metal is coated with a paint comprising finely-divided Al suspended in a volatile solvent containing a proportion of the condensation product of an equimol. mixture of glycerin and phthalic anhydride. When the solvent has evaporated, the metal is heated at 380° to volatilise the resin, and then at a higher temp. to cause the Al to diffuse into the surface layers. A. R. POWELL.

Manufacture of a corrosion-retarding compound. O. E. ANDRUS and M. A. MATUSH, Assrs. to A. O. SMITH CORP. (U.S.P. 1,800,881, 14.4.31. Appl., 15.9.28).—To prevent the corrosion of Cu or Fe apparatus used in the distillation or cracking of hydrocarbon oils a quantity of a product obtained by treating gas oil with NaOH, Na_2CO_3, CaO, or $Ca(OH)_2$ at 180—200° and oxidising with a current of air is added to the oil. The alkali suspension retards the action of the S compounds in the oil on the metals. A. R. POWELL.

Preventing the erosion of metallic objects [turbine or propeller blades]. INTERNAT. GEN. ELECTRIC CO., INC., Assees. of ALLGEM. ELEKTRICITÄTS-GES. (B.P. 360,230, 3.12.30. Ger., 4.12.29).—The edges of the blades are covered with a thin sheet of a metal having a high resistance to erosion, *e.g.*, Cr, Mo, W, or alloys of these metals. The sheet is lapped round the edges, which are recessed to receive it, and then welded to the blade. A. R. POWELL.

Tarnish-resisting [silver] alloys and methods of rendering tarnishable metals or alloys tarnish-resisting. W. W. TRIGGS. From ONEIDA COMMUNITY, LTD. (B.P. 359,014, 11.7.30).—Alloys of Ag with 4—45% Zn are claimed; the alloys may be deposited on other metals by electrolysis of cyanide solutions of Ag and Zn. Ag or its alloys are rendered tarnish-resisting by plating them with Zn and then heating the plated article at 250° to cause the Zn to diffuse into the Ag. A. R. POWELL.

Cooling of annealed material [copper]. FELTEN & GUILLEAUME CARLSWERK A.-G. (B.P. 360,794, 23.3.31. Ger., 2.4.30).—After being removed from a furnace, the Fe annealing boxes are sprinkled on the outside by means of annularly arranged roses. C. A. KING.

Nickel-silver-tin-copper alloys. R. OZLBERGER, JUN. (B.P. 361,711, 23.1.31. Ger., 23.1.30).—A Cu alloy with $>$ 90% Cu, 6—9% Sn, 0·1—3·8% Ni, and 0·1—1·8% Ag, with up to 2% Zn, Al, Cd, Be, V, or Co, is claimed. A. R. POWELL.

Zinc condenser. H. A. GRINE, Assr. to GRASSELLI CHEM. CO. (U.S.P. 1,803,611, 5.5.31. Appl., 25.5.27).—The interior of the ordinary type of Zn condenser is coated with a mixture of raw clay and grog which has been lightly burned. A. R. POWELL.

Treating metals [aluminium] with nitrogen. R. J. ANDERSON, Assr. to FAIRMONT MANUFG. CO. (U.S.P. 1,802,693, 28.4.31. Appl., 1.5.28).—N_2 is bubbled through molten Al at 700° to remove suspended impurities. A. R. POWELL.

Treatment of aluminium or aluminium alloys [to produce a dielectric coating thereon]. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of F. M. CLARK (B.P. 361,364, 9.7.30. U.S., 16.7.29).—The articles are treated for 10 min. at 65—75° in a solution containing 2—6% NaOH, 1·5—3% NH_3, and 2·5—12% Na_2SiO_3, whereby a dense, adherent coating of Al oxide and silicate is produced. [Stat. ref.] A. R. POWELL.

Aluminium-silicon alloys. ALUMINIUM, LTD., Assees. of L. W. KEMPF (B.P. 361,149, 12.12.30. U.S., 14.1.30).—Al alloys with 2—25% Si and 0·2—0·4% Zr are claimed; the addition of Zr produces smooth castings free from pitting and cracking. A. R. POWELL.

Perforated foils of pure aluminium acting as a protective agent for other metals against corrosion. DORNIER-METALLBAUTEN G.M.B.H., and C. DORNIER (B.P. 358,760, 4.11.30. Ger., 17.12.29).—Articles made of Al alloys are protected from corrosion by covering them with a thin foil of pure Al containing regularly distributed, circular, square, or polygonal perforations. A. R. POWELL.

Improving the mechanical properties of magnesium alloys. I. G. FARBENIND. A.-G. (B.P. 359,425, 16.6.30. Ger., 29.6.29).—The alloys are superheated at above 800° for at least 15 min., then allowed to cool to the usual pouring temp., and cast. The resulting castings have a fine-grained structure with a high yield point, tensile strength, and elongation, these vals. for a 3% Al-Mg alloy superheated at 900° being, *e.g.*, 6·7 and 18·9 kg. per sq. mm., and 10·2%, respectively. A. R. POWELL.

Treatment of zinciferous materials containing cadmium. New Jersey Zinc Co., Assees. of L. E. Teter (B.P. 359,923, 22.5.30. U.S., 14.6.29).—Zn concentrates containing Cd are moistened with a solution of NaCl and subjected in this state to a blast-roasting operation, whereby the Cd is volatilised as $CdCl_2$ and a ZnO sinter is obtained which yields a high-grade Zn in the continuous distillation process.

A. R. Powell.

Refining of metals [lead]. Amer. Smelting & Refining Co., Assees. of J. O. Betterton (B.P. 360,789, 19.3.31. U.S., 29.3.30).—Pb is treated at 350° with Ca and Mg and/or Ba, added preferably as a Pb alloy. The scum containing the Bi is skimmed off and the excess of Ca, Mg, and Ba is removed by treatment with Cl_2 at 400° under a layer of molten $ZnCl_2$. A. R. Powell.

Lead alloys [for extrusion]. H. Harris (B.P. 360,422, 6.5.30).—Alloys for the manufacture of pipes, sheathing, and sheet comprise Pb with up to 1% Zn together with up to 1·8% Sn and/or 1·8% Sb.

A. R. Powell.

Removal of carbon impurities from refractory rare metals, particularly tantalum. A. E. White. From Fansteel Products Co., Inc. (B.P. 358,531, 8.4.30).—Ta powder containing C is intimately mixed with MgO, BeO, or Li_2O, the mixture is pressed into bars, and these are heated in vac. at 1800—2000° until CO ceases to be evolved; the temp. is then raised to just below the m.p. of Ta until the Mg, Be, or Li is eliminated from the bar, which is then worked into sheet or wire in the usual way. A. R. Powell.

Manufacture of tungsten wire. Gen. Electric Co., Ltd., Assees. of Patent-Treuhand-Ges. f. Elektr. Glühlampen m.b.H. (B.P. 359,389, 19.12.30. Ger., 30.1.30).—W wire made from W powder containing 0·3% K_2O and 0·3% SiO_2 is passed through a heating zone at above 2000° at a speed which is several times that of crystal growth, whereby long, well-interlocked crystals are produced which make the wire resistant to sagging and to fracture by shock. A. R. Powell.

Production of gas-free and oxide-free cast bars and other castings. A. Godefroid (B.P. 358,563, 10.7.30).—Cu, Ni, Al, Mg, and Fe alloys are heated at 50—200° above the normal casting temp. to cause the metal to adsorb large quantities of gas; the metal is then cooled slowly or suddenly to just above the m.p. while the pressure is continuously or intermittently reduced to cause sudden evolution of the adsorbed gases.

A. R. Powell.

[Silicon-]aluminium alloys. J. Hanco (B.P. 361,248, 2.4.31).—Alloys containing 65—75 (74)% Al, 5—15 (10)% Cu, 6—14 (10)% Si, 1·5—2·5 (2)% Ni, 1·5—2·5 (2)% Mg, and 1·5—2·5 (2)% V are claimed, especially for use in the manufacture of internal-combustion engines. A. R. Powell.

Removal of arsenic from lead bullion. R. C. Rutherford, Assr. to Amer. Smelting & Refining Co. (U.S.P. 1,803,771, 5.5.31. Appl., 26.7.29).—Pb ores containing As are roasted to remove most of the S, then smelted with sufficient Cu to combine with the remaining S, As, and Fe to form speiss and matte, leaving a Pb bullion containing $<$0·05% As. A. R. Powell.

Electrical-resistance [chromium-nickel] alloys. W. B. Driver and S. R. Keith, Assrs. to Gilby Wire Co. (U.S.P. 1,803,467—8, 5.5.31. Appl., 3.7.30).—Alloys with a high electrical resistance comprise (a) 2—5 (2·5)% V, 5—40 (40)% Mn, 35—50 (35)% Ni, 5—20 (15)% Cr, and the balance (7·5%) Fe, or (b) 5% Al, 2—3·5% V, 15% Cr, 60—75% Ni, and the remainder Fe.

A. R. Powell.

Flux for soft soldering. H. B. Dykstra, Assr. to Grasselli Chem. Co. (U.S.P. 1,800,445, 14.4.31. Appl., 24.3.30).—The application of such substances as polymerised chlorostyrene, α-polyvinyl chloride, chlorinated *m*-styrene, and polymerised vinyl chloroacetate is claimed. A. R. Powell.

Zinc chloride base flux [for soft soldering]. W. K. Schweitzer, Assr. to Grasselli Chem. Co. (U.S.P. 1,800,477, 14.4.31. Appl., 26.12.29).—A mixture of 35% of 70% $ZnCl_2$ solution, 35% of conc. HCl, 10% of EtOH, 2·5% of NH_4Cl, and 17·5% of H_2O, to which 1—2% of an alkyl ester of a fatty acid (*e.g.*, amyl acetate) has been added, is claimed.

A. R. Powell.

Coating articles of all kinds with thin layers of metals or metalloids. K. Richter (B.P. 360,826, 6.6.30).—The metal or metalloid is vaporised in vac. by passing a current through a wire having a higher m.p. than that of the coating metal, the wire being previously coated with this metal by electrodeposition or by dipping in the molten metal. To prevent alloying, the heating metal may first be coated with a substance which does not alloy with the metal to be vaporised. *E.g.*, Ag is vaporised from a Ta wire plated with Ag, Co from a Co wire which had been dipped into molten Cd, Au from a Ta wire carburised on the surface and then plated with Au, and Si from a carburised Ta wire coated with Si by heating in SiH_4. A. R. Powell.

[Sheet-heating] furnaces. S. E. and A. P. Diescher (S. Diescher & Sons), Assees. of S. E. Diescher (B.P. 357,373, 25.9.30. U.S., 25.9.29).—See U.S.P. 1,800,170; B., 1931, 1125.

[Tubular] casting [moulds for] metals. Osnabrucker Kupfer- u. Drahtwerk (B.P. 362,338, 29.7.31. Ger., 29.7.30).

Heat-treating furnaces. Strength of solutions.—See I. **Cyanide recovery.**—See VII. **Pt–Ni cathodes. Cr-plate. Contact terminal.**—See XI. **Zn-white.**—See XIII. **Adhesive.**—See XV.

XI.—ELECTROTECHNICS.

Electrolytic reduction of nitrobenzene to *p*-aminophenol. F. M. Brigham and H. S. Lukens (Trans. Amer. Electrochem. Soc., 1932, **61**, 31—53).—The influence of the cathode material, c.d., acid concn., temp., and duration of electrolysis on the yield and current efficiency of production of *p*-aminophenol by electrolytic reduction of a well-stirred suspension of $PhNO_2$ in H_2SO_4 solution in a diaphragm cell has been investigated. Cathodes of Cu, Ag, Ni, or Acheson graphite are about equally effective. The optimum concn. for the H_2SO_4 is about 50%. Darmstädter's claim, that unreduced $PhNO_2$ protects *p*-aminophenol from further reduction, is not supported, but max. yields are obtained when about 90% of the $PhNO_2$ is reduced. The yield increases with c.d. to a max. which depends on the ratio vol. of $PhNO_2$/vol. of solution in the original catholyte, the optimum val. of this ratio being about 5 : 16. The yield can approach 65% at a current efficiency of 62%. Raising the temp. increases consumption of $PhNO_2$, but when accompanied by increased c.d. favours increased yield of *p*-aminophenol. A method for determining *p*-aminophenol in the final solution has been developed. C_6H_6 was sometimes detected among the products. The formation of coloured substances such as emeraldine and nigraniline is discussed. H. J. T. ELLINGHAM.

Passivity of anodes in nickel baths. O. GRUBE (Metallwaren-Ind. Galvano-Tech., 1930, **28**, 516—517; Chem. Zentr., 1931, i, 3657).—Passivity is discussed; passive anodes diminish the current yield and lead to the production of H_2SO_4. Cast anodes are more readily dissolved than rolled anodes. Passivity is favoured by increase in SO_4 content and decrease in Cl content of the bath. A. A. ELDRIDGE.

Voltage regulator for furnace control. V. H. STOTT (J. Sci. Instr., 1931, **8**, 313—316).

Electrolysis of NaCl. $NaClO_3$.—See VII. **Ceramic bodies for heating devices.**—See VIII. **Plating with Pt, Cr, Cd, Zn–Cd, and Fe, Cu, and Ni alloys.**—See X. **Electro-osmose apparatus for H_2O.**—See XXIII.

See also A., Dec., 1364, **Magnetic Pt alloys.** 1371, **Ag–Au. Anodal polarisation of Pt. Cu deposition.** 1377, **Ti, U, and V amalgams. Electro-deposited metal foils. β-W. Anodic pptn. of PbO_2.** 1386, **Determination of Co.** 1387, **Determination of turbidity in liquids. Applications of thermionic valves.** 1389. **Alloys for vac.-tight glass–metal joints.**

PATENTS.

Electric induction furnaces. L. DREYFUS, and ALLMÄNNA SVENSKA ELEKTRISKA AKTIEBOLAGET (B.P. 362,134, 17.11.30).—A suitable condenser is arranged in circuit between the generator and the furnace and condenser battery to compensate substantially the inductive voltage drop in the generator, and between the latter and the furnace and/or condenser battery. J. S. G. THOMAS.

[Automatic control of] induction [muffle] furnaces. A. CARPMAEL. From UGINE-INFRA (B.P. 360,827, 5.7.30).—The muffle forming the secondary winding is made of reversible or irreversible ferromagnetic material, *e.g.*, Fe, Co, Ni, or their alloys, and is so arranged that the heating effect is largely dependent on the permeability of the material. J. S. G. THOMAS.

[Tubular] metallic resistor element [for electric furnaces]. T. F. BAILY (U.S.P. 1,809,227, 9.6.31. Appl., 11.3.26).—Spaced, parallel tubes of heat-resisting alloy are connected at alternate ends to form a continuous, sinuous resistor through which fluid may be passed and caused to impinge upon material in the furnace. J. S. G. THOMAS.

Electric heating body. L. MELLERSH-JACKSON. From SIEMENS PLANIAWERKE A.-G. F. KOHLEFABRIKATE (B.P. 361,960, 27.8.30).—A centrally-perforated disc thickened from the periphery towards the centre and having radial slots is claimed. J. S. G. THOMAS.

[Negative] electrodes for electric accumulators having alkaline electrolytes. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 361,164, 24.12.30).—Electrodes composed of Fe, preferably prepared by decomp. of $Fe(CO)_5$, and strips of Fe–Ni (10% Ni) alloy are used. J. S. G. THOMAS.

Electrical storage batteries. YOUNG ACCUMULATOR CO. (1929), LTD., and R. S. HARBORNE (B.P. 362,120, 17.11.30).—Envelopes composed of porous ebonite lined with material resistant to electrolyte, *e.g.*, glass wool, and bearing against the active faces of the electrodes are used as separators. J. S. G. THOMAS.

Electric-discharge [rectifying] tubes. EDISON SWAN ELECTRIC CO., LTD., Assees. of H. J. SPANNER (B.P. 360,419, 5.5.30. Ger., 4.5.29).—A cold cathode comprising a core of neutral metal, *e.g.*, Ni, coated with active material composed of a mixture of an electropositive metal, *e.g.*, Ba, and a metal compound of low thermal conductivity, *e.g.*, Cs tungstate, Sr zirconate, Mg cuprate, or Ba zincate, and an anode, *e.g.*, of Fe, Ni, W, or graphite, are arranged in a container filled with a rare gas, *e.g.*, A, at 1—5 mm. pressure, mixed with Hg or Cs vapour. J. S. G. THOMAS.

Dry electric rectifiers. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 361,737—8, 13.2.31. Holl., [A] 7.3.30, [B] 8.3.30).—(A) A cathode made of Al coated with an Al compound, *e.g.*, Al_2O_3, and an anode made, at least partly, of red P are used. (B) A cathode made, at least partly, of a metal of the first sub-group of group IV and coated with one or more compounds, *e.g.*, the oxides, of this metal, and an anode consisting of a compound containing as negative component an element of the halogen, N, and/or O-groups, *e.g.*, Cu_2S, together with S, are used. J. S. G. THOMAS.

Luminescent gas-discharge tubes. CLAUDE NEON LIGHTS, INC., Assees. of L. L. BECK (B.P. 360,446 and 360,823, 5.6.30. U.S., 26.6.29).—(A) A hot cathode having sufficient electron emission to make the potential drop between the cathode and surrounding gas low, but above the ionisation potential of the gas, is arranged in a transparent envelope filled with one or more of the gases A, Kr, Xe, together with Hg vapour if desired, and having an external electrode. (B) A discharge tube having a hot or alkali-pool cathode, *e.g.*, of K, is filled with Ne containing about 1% Kr. [Stat. ref.] J. S. G. THOMAS.

[Ultra-violet] gaseous electric-discharge devices. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of T. E. FOULKE (B.P. 361,394, 21.7.30. U.S., 27.7.29).—A getter composed of alkaline compound, *e.g.*, the oxide, hydroxide, or carbonate of an alkali or alkaline-earth metal, is arranged on or near two parallel metallic, *e.g.*, Ni, electrodes spaced 0·5—2·0 mm. apart in an envelope containing a gas filling at about 30 mm. pressure, *e.g.*, Ne (75%) and He (25%), together with Hg vapour. J. S. G. THOMAS.

Manufacture of cathodes for electric-discharge tubes. Verein. Glühlampen u. Elektricitäts A.-G. (Egyesült Izzolámpá és Villamossági Részvénytársaság) (B.P. 360,803, 25.4.31. Hung., 25.4.30. Addn. to B.P. 289,763; B., 1929, 290).—The reaction mixture described previously is at least partly reduced by heating *in vacuo* or in an inert gas, before being introduced into the tube. J. S. G. Thomas.

Electric incandescence lamps. E. Bornand and H. A. Schlaepfer (B.P. 361,496, 26.9.30. Ger., 4.10.29).—Refractory material, *e.g.*, MgO, CeO_2, ThO_2, contained in a glass envelope is heated to incandescence by the field produced by a high-frequency current flowing in a coil arranged in the envelope. J. S. G. Thomas.

[Clean-up of] electron tubes. A. A. Thornton. From Radiowerk E. Schrack A.-G. (B.P. 362,086, 13.10.30).—The greater part of the getter condenses on a fibrous body of relatively large area arranged within the tube. J. S. G. Thomas.

Electron-discharge [photoelectric] devices. Brit. Thomson-Houston Co., Ltd., Assees. of P. J. Johnston (B.P. 361,726, 2.2.31. U.S., 1.2.30).—A method of making contact between the Pt end of the leading-in wire and the light-sensitive material is described. J. S. G. Thomas.

Gas-filled electric-discharge vessels. W. L. W. Schallreuter (B.P. 360,362, 30.7.30).—An envelope made at least partly of opal glass is claimed. J. S. G. Thomas.

[Soft] *X*-ray tubes. Westinghouse Lamp Co., Assees. of C. M. Slack (B.P. 361,179, 9.1.31. U.S., 9.1.30).—Such tubes are provided with a "window" (0·001—0·05 mm. thick), of glass or other vitreous material, shaped to withstand atm. pressure and permeable to *X*-rays of wave-lengths 2—8 Å. J. S. G. Thomas.

Introduction of the decomposition products of glass into vessels and its use for various purposes. Verein. Glühlampen u. Elektricitäts A.-G. (B.P. 361,925, 27.8.30. Austr., 28.8.29).—The inner surface of the vessel is coated with a film of metal ($<$ 0·001 mm. thick) which is used as cathode in the electrolysis of the glass of the vessel immersed in a bath of fused salt, *e.g.*, $NaNO_3$. The process is applicable to the purification of the rare gases. J. S. G. Thomas.

Making [platinum-nickel] cathodes. H. T. Reeve, Assr. to Western Electric Co., Inc. (U.S.P. 1,809,067, 9.6.31. Appl., 9.6.28).—Pt–Ni alloy, melted within a crucible of Cr_2O_3 lined with alkaline-earth oxides, combines within the lining, and the melt is drawn to form filamentary cathodes. J. S. G. Thomas.

Manufacture of electron-emitting coated cathodes. Allgem. Elektricitäts-Ges. (B.P. 361,560, 30.11.30. Ger., 8.11.29).—The outer layer of a carrier wire of W is converted into $BaWO_4$ by anodic treatment during passage through a bath of baryta lye, and the coating is afterwards reduced to BaO or $BaCO_3$. J. S. G. Thomas.

Coating of thermionic cathodes. J. R. Wilson and C. M. Blackburn, Assrs. to Bell Telephone Laboratories, Inc. (U.S.P. 1,809,095, 9.6.31. Appl., 30.11.27).—A metallic core, passed through a molten bath of $Ba(NO_3)_2$ and $Ca(NO_3)_2$ at 550—800°, is heated at about 850° to convert the coating of nitrates into oxides. J. S. G. Thomas.

Cathodes for thermionic valves. M.-O. Valve Co., Ltd., and J. H. Phillips (B.P. 361,184, 14.1.31).—Wires made of strands twisted or braided together are carbonised by heating in the vapour of an org. compound (*e.g.*, a hydrocarbon). J. S. G. Thomas.

Manufacture of carriers provided with a light-sensitive substance. N. V. Philips' Gloeilampenfabr. (B.P. 361,750, 23.2.31. Holl., 22.3.30).—Light-sensitive material, *e.g.*, AgBr or TlCl, is deposited from the vapour state upon a carrier which may be coated with an absorbent, *e.g.*, CaF_2. J. S. G. Thomas.

[Light-sensitive electrodes of] photoelectric cells. Gramophone Co., Ltd., W. F. Tedham, and G. B. Baker (B.P. 361,118, 21.11.30).—The surface of the metal backing or support, *e.g.*, of Ag, is oxidised, prior to deposition of the light-sensitive material, by applying a continuous-wave, high-frequency discharge in O_2 at 0·2 mm. pressure or less. J. S. G. Thomas.

Photoelectric devices. M. A. E. Pressler (B.P. 360,416, 2.8.30. Ger., 5.8.29).—Practically the whole of the utilisable inner side of the wall of the cell is covered with a translucent photosensitive layer, *e.g.*, of Pt. J. S. G. Thomas.

Conductivity cell. L. Behr, Assr. to Leeds & Northrup Co. (U.S.P. 1,807,821, 2.6.31. Appl., 9.1.29).—One of the electrodes of the cell is divided into parts so positioned with respect to each other and to the other electrode and surrounding parts that flow of current in paths other than a direct path in the fluid between the electrodes is prevented. J. S. G. Thomas.

Arc electrodes for use in therapeutic treatment. W. G. Moore (B.P. 327,464, 10.1. and 20.7.29).—The electrode is composed of an alloy of W with 0—5% Ti, 0·25—2% Cr, and a small proportion of U, the W content being at least 94%. A. R. Powell.

Arc electrodes for use in therapeutic treatment, in the treatment of food, etc. W. G. Moore (B.P. 354,404, 13.5.30. Addn. to B.P. 327,464; preceding abstract).—A C electrode with a core composed of W with 1—5% Ti, 0·5—5% U, and $\not>$ 5% Cr is claimed. J. S. G. Thomas.

Coating arc-welding electrodes. Wilson Welder & Metals Co., Inc., Assees. of S. S. Stewart (B.P. 360,792, 20.3.31. U.S., 25.4.30).—Electrodes are agitated in coating material contained in tumbler-barrels so as to remain substantially parallel, but alternately inclined in opposite directions. J. S. G. Thomas.

Apparatus for electrolysis of liquids under pressure. A. Mentzel (B.P. 360,774, 25.2.31).—The space between the electrolyte container and the surrounding pressure vessel is filled with insulating hydrocarbon material, *e.g.*, asphalt or paraffin wax, which is liquid at the operating temp. J. S. G. Thomas.

Regulating the circulation of electrolyte in pressure decomposers with a separate circulation of anolyte and catholyte. A. Mentzel (B.P. 362,219, 27.1.31).—Heating, cooling, or throttling devices are employed. J. S. G. Thomas.

Anode [for electrodeposition of chromium]. J. Becker (U.S.P. 1,807,585, 2.6.31. Appl., 13.5.27).—An anode of steel containing 0·25—15% Si is immersed in aq. H_2CrO_4. J. S. G. Thomas.

Collecting electrodes for use in the electrical precipitation of suspended particles from gaseous fluids. Lodge–Cottrell, Ltd. From Metallges. A.-G. (B.P. 360,809 and 362,337, [A] 15.5.31, [B] 24.7.31). —(A) Semi-conducting material, *e.g.*, cement and/or asbestos, is arranged between the parts which, in combination with the electrode surface (preferably earthed), form the catch-spaces. (B) The shorter and longer edges of rectangular perforations in the electrodes lie respectively in, and at right angles to, the direction of flow of gas. J. S. G. Thomas.

Electrical precipitation of suspended particles from gaseous fluids. Lodge–Cottrell, Ltd. From Internat. Precipitation Co., Inc. (B.P. 362,290, 21.3.31).—Means for mounting the discharge and collecting electrodes of precipitators of the rod–curtain type to prevent warping and buckling are claimed. J. S. G. Thomas.

Insulted electrical conductor. C. A. Barker, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,809,011, 9.6.31. Appl., 4.6.27).—A Cu conductor is coated with a plastic mass composed of nitrocellulose (26%), tritolyl phosphate (39%), gypsum (14%), ZnO (14%), and denatured EtOH (7%, by wt.). J. S. G. Thomas.

Manufacture of resistance material. E. J. Haverstick, Assr. to Westinghouse Electric & Manufg. Co. (U.S.P. 1,806,347, 19.5.31. Appl., 3.7.26).—Powdered flint is mixed with a mixture of powdered flint, lampblack, and water, a binder is added, and the mass formed and baked. J. S. G. Thomas.

[Fibrous sheet] electrical insulating materials. Internat. Gen. Electric Co., Inc., Assees. of Allgem. Elektricitäts-Ges. (B.P. 360,848, 6.8.30. Ger., 7.8.29). —Material composed of alternate layers of pressed and unpressed paper, or of unpressed paper having one side smooth, is impregnated with oil. J. S. G. Thomas.

[Securing] electric [porcelain] insulators [to supports etc.]. Hermsdorf-Schomburg-Isolatoren G.m.b.H. (B.P. 362,233, 5.2.31. Ger., 7.2.30).—Hemp binding soaked in a synthetic resin, *e.g.*, Bakelite, and then hardened by heat is used. J. S. G. Thomas.

Electrolytic filter condenser. E. W. Engle, Assr. to Fansteel Products Co., Inc. (U.S.P. 1,808,498, 2.6.31. Appl., 22.3.28).—A filmed Ta plate supported by an insulator is immersed in an anhyd. glycerin solution of H_2SO_4 contained in a vessel forming the other plate of the condenser. J. S. G. Thomas.

Electrical contact terminal. C. F. W. Bates, Assr. to Ohio Instrument Manufg. Co. (U.S.P. 1,807,581, 2.6.31. Appl., 5.11.28).—An alloy composed of W or Mo (95—50%), Si (0·2—5%), Cu (5—45%), and, if desired, Ag (0—25%), together with a metal of the Fe group (0·5—2%) is claimed. J. S. G. Thomas.

Heat fuse especially for electric heating apparatus such as boilers and the like. P. A. Jud (B.P. 362,000, 4.9.30).

[Stopper for] electric accumulators. Britannia Batteries, Ltd. (B.P. 362,719, 7.1.31. Ger., 7.1.30).

Electric dry-cell battery and seal therefor. C. P. Deibel (B.P. 362,659, 29.11.30. U.S., 11.9.30).

High-voltage electric-discharge rectifier having an incandescent cathode. C. H. F. Müller A.-G. (B.P. 362,184, 23.12.30. Ger., 24.12.29).

Mercury-vapour rectifiers. A.-G. Brown, Boveri & Co. (B.P. [A] 361,515, 6.10.30, and [B] 361,776, 20.3.31. Ger., [A] 16.10.29, [B] 26.3.30).

[Gas-filled] electric luminous-discharge tubes. Gen. Electric Co., Ltd., Assees. of Patent-Treuhand Ges. f. elektr. Glühlampen m.b.H. (B.P. 361,804, 17.4.31. Ger., 7.7.30).

Electric-discharge devices. Brit. Thomson-Houston Co., Ltd., Assees. of A. W. Hull (B.P. 362,303, 14.4.31. U.S., 14.4.30).

[Indirectly-heated cathodes for] electron-discharge devices, particularly gas-filled rectifying tubes. N. V. Philips' Gloeilampenfabr. (B.P. 362,627, 12.11.30. Holl., 22.1.30).

[Gas-filled] luminous discharge rectifier tubes. Egyesült Izzólámpa és Villamossági Részvénytársaság (B.P. 361,770, 17.3.31. Hung., 18.3.30).

[Mountings for] X-ray apparatus. O. H. Pieper (B.P. 361,855 and 361,870, 19.7.30).

Chemical receivers for telegraphic pictures. Siemens & Halske A.-G. (B.P. 361,989, 3.9.30. Ger., 18.9.29).

Magnetic separating apparatus. Gen. Electric Co., Ltd., and J. B. Kramer (B.P. 362,124, 11.11.30).

Manufacture of [elastic varnished] fabric for electric insulating bands. L. Mellersh-Jackson. From Siemens–Schuckertwerke A.-G. (B.P. 359,533, 22.7.30).

Rotary-hearth furnace. Tunnel furnace. Thermostats. Determining strength of solutions.—See I. **Desulphurising hydrocarbons. Oil purification.**—See II. **Glass [bulbs]. Corundum.**—See VIII. **Hardening concrete etc. Dielectric asbestos lumber.**—See IX. **Cleaning of roaster gases. Casting steel. Case-hardening steel etc. Magnetisable metal. Dielectric-coated Al. Resistance alloy. Coating with metals or metalloids.** —See X. **Reclaimed rubber.**—See XIV. **Purifying H_2O.**—See XXIII.

XII.—FATS; OILS; WAXES.

Drying and yellowing of linolenic triglyceride. J. Scheiber (Farbe u. Lack, 1931, **36**, 511—512; cf. B., 1931, 982).—Absence of H_2O inhibits entirely the yellowing of films of linseed and tung oils, and of $\Delta^{\theta\kappa}$-octadecadienoic triglyceride (containing Co and Pb–Mn as driers) stored in dull light (in desiccators) for 2 years (*a*); similar films exposed to ordinary air yellowed within a few months, and the colourless films (*a*) darkened rapidly on subsequent exposure to the atm. The yellowing is explained as the formation of coloured *vic*-diketones from the first-formed oil peroxides, H_2O

acting as O acceptor and generating H_2O_2; bleaching under illumination is regarded as a reduction process. Ordinary oil impurities have no effect.

E. Lewkowitsch.

Stand oils. H. Wolff and G. Zeidler (Farben-Ztg., 1931, 37, 269—271, 305—307).—The changes in I val. and viscosities of linseed and tung oils heated at different temp. normally, blanketed with CO_2, and with a stream of CO_2 bubbling through, were observed. No definite relationship between I val. and viscosity could be established. When " true I vals." (van Loon) were observed in the case of the experiments using CO_2, very little change in that val. took place except in the case of relatively viscous materials, depolymerisation being tentatively offered as an explanation. Solutions of the oils were heated at 20° and 50° and the various changes followed, by analogy with Staudinger's work on polystyrenes. The results are contradictory and the anticipated evidence on association and mol. wt. was not forthcoming. The results are discussed in the light of Wolff's views on the colloidal nature of the process.

S. S. Woolf.

Determination of the "cold-test" figure for oils, particularly neatsfoot oil. K. Rietz (Collegium, 1931, 652—654).—The following method of Wizöff has been adopted by the I.V.L.I.C. The " cold-test " figure is taken to represent the temp. at which the oil will remain clear for 1 hr. after it has reached that temp. The oil must be preheated at 105° in a porcelain basin for 15 min. or until quite clear, cooled for 30—45 min. in a desiccator at 20°, pipetted into a reagent glass surrounded by a suitable cooling solution contained in an Fe vessel, which is itself surrounded by an ice mixture. After the oil has reached the correct temp. it is left for 1 hr., the reagent glass is removed, and if the oil is not clear the determination is to be repeated at a temp. 5° higher.

D. Woodroffe.

Influence of the quality and quantity of siccatives on the speed of drying of linseed oil. V. S. Kiselev and I. I. Golovistikov (J. Chem. Ind., Russia, 1930, 7, 1348—1355).—Mn is active in amounts not exceeding 0·06%; addition to Mn of other metals (Ca, Mg, Al, Fe, and traces of Co) accelerates the drying and renders it more even. Mn with Pb causes rapid drying.

Chemical Abstracts.

Colour reactions of cod-liver oil. R. T. A. Mees (Chem. Weekblad, 1931, 28, 694—696).—A colour more stable than that obtained with the Carr and Price reagent is given by a 10% solution of $SbCl_3$ in C_6H_6; the latter reagent, however, is less sensitive.

S. I. Levy.

Unsaponifiable matter of calamary oil. M. Tsujimoto (Bull. Chem. Soc. Japan, 1931, 6, 289—293; cf. B., 1928, 340).—The unsaponifiable matter (4·5%) from an oil of I val. 184·1 (cf. *loc. cit.*) contained 48% of cholesterol. Cetyl, batyl, and selachyl alcohols were identified; a vitamin substance and probably chimyl and oleyl alcohols with a small amount of more unsaturated alcohols are present.

E. Lewkowitsch.

Oil-bearing plants of the Belgian Congo. L. Adriaens (Ann. Soc. Sci. Bruxelles, 1931, B, 31, 228—247).—A collection of recorded data.

Problems in the chemistry of fats and waxes. K. H. Bauer (Pharm. Zentr., 1931, 72, 801—808).

Spray drying.—See I. **Fat in milk.**—See XIX.

See also A., Dec., 1377, **Catalysed hydrogenation.** 1388, **Apparatus for analytical control.** 1395, **Isomerism of linoleic acid. Composition of linseed oil.** 1421, **α-Carotene from palm oil.** 1442, **Differentiation of fats by dyes. Hydrocarbon in ishinagi-liver oil.** 1452, **Bromo-oleic acid.** 1463-5, **Vitamins (various).** 1463, **Vitamin-*B* from fish oils.**

Patents.

Determination of fat contents. Schwarz Laboratories, Inc., Assees. of C. P. Harris (B.P. 361,457, 3.9.30. U.S., 18.9.29).—A standard amount of fatty material (*e.g.*, cacao products) is treated with a fixed amount of a standardised mixture of 85% of *o*- and 15% of *p*-$C_6H_4Cl_2$, and the fat content of the filtered solution is determined by a direct-reading hydrometer (cf. B., 1931, 500).

E. Lewkowitsch.

Treatment of vegetable products [cacao] containing fat. A. A. Thornton. From L. M. Brown (B.P. 361,461, 8.9.30).—The proteins in the aq. suspension of the ground material, *e.g.*, cacao, are solubilised by treatment with papain and pepsin, and the mixture is heated to about 80° to allow the liberated fat to settle out. The filtered aq. layer is used for theobromine extraction and the residues may be used as food products.

E. Lewkowitsch.

Production of washing agents. Michael Ind., A.-G. (B.P. 361,658, 15.12.30. Ger., 17.12.29).—Solid Na (curd) soaps (15—35% H_2O) are mixed with detergent agents, or salts having softening, wetting, or bleaching powers, including O_2-evolving compounds, *e.g.*, $NaBO_3$, and laminated and cut into flakes etc. Solvents and emulsifiers may be included.

E. Lewkowitsch.

Manufacture of resinous soaps [for sizing paper]. C. Gillet (B.P. 361,335, 16.6.30).—Saponification of the resin is effected partly in the first stage with an aq. mixture of alkali carbonate and bicarbonate (*e.g.*, 2 : 1) and completed in a second stage with aq. NH_3. An open boiler is described, containing steam-pipes surmounted by an open, truncated, conical cap up which the froth rises and, by flowing back over the air-cooled outer face to the bottom of the pan, ensures circulation of the mass.

E. Lewkowitsch.

Extractor for fats etc.—See I. **Lubricant.**—See II. **Hydrogenation of carboxylic acids. Higher aliphatic alcohols. Wetting etc. agents.**—See III. **Cleansing agents.**—See XV. **Vegetable albumins. Chocolate etc. Vitamins.**—See XIX. **Fat-sol. Bi salts.**—See XX.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Characteristics of turpentines obtained by different methods. P. N. Nikolaev (J. Chem. Ind., Russia, 1929, 6, 1585—1590).—A review. Purification by H_2SO_4 and $K_2Cr_2O_7$ is advocated.

Chemical Abstracts.

Transference of colour processes from laboratory to works. J. Barker (J. Oil Col. Chem. Assoc., 1931, 14, 351—361).—The chemical and physical differences arising in such transference are compared and contrasted. Raw materials must be controlled, H_2O often being overlooked, although 5—10% of the dye may be pptd. as the Ca salt by hard water. Control of temp. is more difficult, and times of operations are invariably longer. To control the concn. it is recommended that all vats, tanks, and filters should be calibrated, high narrow tanks being preferred. It is suggested that rapid agitation alters particle size and hence the shade of the pigment. Dispersing agents have a very pronounced effect on the physical state, but results are conflicting.

F. C. HARWOOD.

Relation between corrosion and paint. W. H. J. VERNON and L. A. JORDAN (Chem. and Ind., 1931, 1050—1057).—The properties of protective films on metals are reviewed. Paint films differ from the natural protective films in having no intimate contact with the underlying metal. Natural continuity and impermeability are regarded as the essentials of a satisfactory paint film; the subsequent behaviour may be regarded from the point of view of the effect of the pigment on the corrosion, *i.e.*, whether corrosion is inhibited, unaffected, or stimulated thereby. Pb_3O_4 is an example of a pigment inhibiting the corrosion of Fe, Fe_2O_3 is generally inert, and graphite, lampblack, and some metallic pigments stimulate corrosion under certain conditions. Attention is directed to the danger of entrapping electrolytes under the film of paint.

E. S. HEDGES.

Optical rotation of gamboge. I. C. PLONAIT and S. LOEBMANN (Chem. Umschau, 1931, 38, 319—321).—The $[\alpha]_D$ for gamboge is about —400° and for the resin extracted by EtOH —420° (in EtOH). The aq. Na_2CO_3 extract from Et_2O solution of the resin yielded resin acids, $[\alpha]_D$ —410° (in EtOH) (Et_2O-sol. residue $[\alpha]_D$ —240°). α- and β-Garcinolic acids (acid val. 108, 91, respectively) were prepared and are considered to be isomerides (not homologues, cf. Tschirch); interconversion occurred on repeatedly evaporating alcoholic solutions of either acid. Tschirch's γ-garcinolic acid could not be detected. The $[\alpha]_D$ for the purified gamboge-resin was —508°, —393°, —374° in C_6H_6, EtOH, and dioxan, respectively, at a concn. of 100 g./litre, but decreased at lower concns.

E. LEWKOWITSCH.

Characteristics of lead chromate pigments. A. W. C. HARRISON (Farben-Chem., 1931, 2, 358—362).—The various Pb chromes and chrome-greens are classified according to shade and composition and a general dissertation on their properties is given, reference being made to purity of tone, alteration of tone in manufacture, texture, oil absorption, effect of various sol. sulphates used in the prep. of the $PbSO_4$ component, effect on drying of paint vehicles, etc.

S. S. WOOLF.

Characterisation of pigments. H. GROHN (Farben-Chem., 1931, 2, 200—205).—A review of published work on the physical and physico-chemical properties of pigments in general.

F. C. HARWOOD.

Optical examination of white pigments; a proposal for standardisation. F. MUNK and A. WEIGL (Z. angew. Chem., 1931, 44, 941—946).—Methods are described for determining brightness, colour intensity, colour tone, covering power, and colouring power.

S. I. LEVY.

Oil absorption of pigments. H. MEIER (Farben-Chem., 1931, 2, 205—208).—The adsorption hypothesis is apparently supported by such cases as red lead, where the oil-absorption figure of the normal substance is about 7% and of the highly-dispersed about 11%. Most pigments, however, of normal particle size give lower oil-absorption figures after fine grinding because the ratio of free space between the particles to total vol. of pigment has been reduced, and this space must be filled with oil to obtain a uniform paste. The anomaly of red lead is due to the conversion of secondary into primary particles. A method of determining oil absorption is given. (Cf. B., 1929, 989.)

F. C. HARWOOD.

Artificial copal [Albertol] varnishes. W. EBELING (Farbe u. Lack, 1931, 36, 505).—Albertol varnishes are shown by experiment to be superior to natural resin varnishes in hardness and elasticity (sand abrasion and bending tests) and resistance to sea-water and alkali. Other advantages of Albertols are rapid drying, purity, and simplification of varnish manufacture.

S. S. WOOLF.

Turpentine content of various grades of fire-still gum rosins. A. R. HITCH (Ind. Eng. Chem., 1931, 23, 1275).—The amount of turpentine retained in rosins of various grades was found to vary appreciably in the same grade and to increase towards the paler grades. Of 36 samples analysed, the average contents of the various grades were X—N 1·59%, M—H 0·67%, and G—D 0·36%.

S. S. WOOLF.

Grass tree resin. A. R. PENFOLD (Tech. Mus., Sydney, 1931, Bull. No. 16, 20 pp.).—Existing information on the occurrence, collection, yield, consumption, grading, industrial uses, etc. of "gum" from Australian grass tree (*Xanthorrhœa* sp.) is summarised. A tentative Australian standard specification is included.

S. S. WOOLF.

Formaldehyde condensation according to G. Blanc. Intermediate stage in the formation of bakelite. N. N. VOROZHTZOV and E. N. YURUIGINA (Zhur. Obshchei Chim., 1931, Chim., 1, 49—64).—The interaction of aq. CH_2O, $ZnCl_2$, and C_6H_6 with HCl at a low temp. (finally 60°) afforded 45% $PhCH_2Cl$ and $C_6H_4(CH_2Cl)_2$, probably some $CH_2(C_6H_4{\cdot}CH_2Cl)_2$ and $CH_2Ph{\cdot}C_6H_4{\cdot}CH_2Cl$, but no CH_2Ph_2; fractionation is accompanied by decomp. (cf. Blanc, A., 1923, i, 549). PhOH and CH_2O at 16° with HCl and in presence or absence of $ZnCl_2$ gave "bakelite-*A*"; decrease in the quantity of HCl and dilution caused the pptn. of $CH_2(p\text{-}C_6H_4{\cdot}OH)_2$, which is assumed to be the only intermediate product. With PhOH : acid = 2 : 1 and PhOH : $ZnCl_2$ = 1 : 1 this substance is formed with all compounds except H_3BO_3 and $ZnCl_2$ in quantities decreasing in the order HNO_3, H_2SO_4, AcOH, H_3PO_4. $(CH_2Cl)_2O$ with aq. PhOH affords $CH_2(C_6H_4{\cdot}OH)_2$ and a bakelite mass.

CHEMICAL ABSTRACTS.

Drying of linseed oil.—See XII. **Rosin and rosin oil in rubber.**—See XIV.

See also A., Dec., 1398, **Artificial resins.** 1442, **Hydroid pigments.**

PATENTS.

Marine paint. G. GOETZ, Assr. to S. M. and G. A. BARR (U.S.P. 1,803,607, 5.5.31. Appl., 5.4.27).—Mixtures of coal tar, NaCN, Portland cement, kerosene, and turpentine are claimed. S. S. WOOLF.

Manufacture of zinc white. V. SZIDON (B.P. 362,297, 1.4.31. Fr., 18.12.30).—Zn residues are washed with H_2O to remove sol. and light insol. impurities and then, in the form of a slurry, are distilled under oxidising conditions by progressive heating to 1000° or above to yield a residue of ZnO and non-volatile impurities, from which the ZnO is subsequently distilled. F. YEATES.

Manufacture of lithopone. NEW JERSEY ZINC CO., Assees. of E. J. FLYNN, G. F. A. STUTZ, and C. B. SCHERTZINGER (B.P. 361,151, 13.12.30 U.S., 21.12.29).—BaS and $ZnSO_4$ liquors are run through separate inlets into one end of a horizontal cylindrical tank provided with stirrers and, at the far end, with an outlet for the lithopone suspension; the concn. of the liquors, the rate of flow, and the degree of agitation are regulated to yield a product in which the average size of the $BaSO_4$ particles is 0·5—0·8 μ and of the ZnS is 0·2—0·5 μ. L. A. COLES.

Manufacture of titanium pigments. J. BLUMENFELD (B.P. 360,436, 2.8.30).—0·1—6% of an alkali-metal compound, *e.g.*, Na or K salts of H_2SO_4, HCl, HNO_3, H_2CO_3, H_3PO_4, not necessarily capable of neutralising acid, nor being sufficient to neutralise H_2SO_4 associated with the ppt., is added, by coagulation from colloidal solution if desired, to TiO_2 pptd. by hydrolysis of Ti sulphate solutions, with or without extenders, and the mixture is calcined at 700—1000°, to obtain a neutral or very slightly alkaline product of improved colour and opacity. S. S. WOOLF.

Manufacture of colour lakes. J. Y. JOHNSON. From I. G. FARBENIND A.-G. (B.P. 356,508, 29.9.30).—Leuco-compounds of basic triarylmethane dyes (which may also contain acid groups) are pptd. as lakes by phosphotungstic or other complex acids in absence of oxidants. The colour lakes are obtained by subsequent oxidation (*e.g.*, with $KMnO_4$). Examples are: leucomethyl-green and phosphotungstomolybdic acid; leucorhodulin-blue 6G and phosphotungstic acid; leucodiamond-green G or leuco-acronol-brilliant-blue and phosphotungstomolybdic acid in presence of di*iso*propylnaphthalenesulphonic acid. C. HOLLINS.

Manufacture of inks and the like. H. HECKEL (B.P. 360,075, 8.8.30).—Pigment is ground in an oil vehicle in the presence of "mahogany sulphonates." Improved colour strength and tone are claimed. S. S. WOOLF.

Writing ink. P. DOMANGE (B.P. 359,793, 12.12.30. Fr., 13.12.29).—2½% of benzilic alcohol is added to writing ink to impart immediate penetration of surface sizing of paper and preserve the clearness of outline. S. S. WOOLF.

[Pigmented] cellulose derivative coating compositions. IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 361,918, 22.8.30. U.S., 23.8.29).—The inclusion of 5—30% (preferably 20—25%) of leaded ZnO in the total (inert) white pigments added hinders or prevents deterioration of the colour of $PbCrO_4$ pigments used in nitrocellulose lacquers. E. LEWKOWITSCH.

[Coating] composition. H. B. DYKSTRA and W. E. LAWSON, Assrs. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,806,152, 19.5.31. Appl., 9.7.28).—Polybenzyl ethers of polyalcohols, *e.g.*, di- or tri-benzyl ethers of glycerol, are used as softeners in compositions containing vinyl ester or chloride polymerides, and prevent the development of brittleness in the coating. E. LEWKOWITSCH.

Manufacture of coating and adhesive compositions and films therefrom. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 359,944, 17.4.30).—Oily polymerisation products of diolefines, *e.g.*, butadiene, polymerised without the aid of alkali metals, are incorporated with cellulose ethers or esters, and/or artificial resins, *e.g.*, of the urea- or thiourea-CH_2O, PhOH-CH_2O, or "glyptal" types, together with org. solvents, and, if desired, drying oils, natural resins, fillers, vulcanising agents, etc. S. S. WOOLF.

Production of colloidal aqueous solutions [of waxes] for coating and impregnating purposes. B. REDLICH, and ELEKTROCHEM. WERKE MÜNCHEN A.-G. (B.P. 359,946, 27.5.30).—A wax, *e.g.*, paraffin wax, is dispersed in H_2O in the presence of an emulsifier, *e.g.*, Na oleate (in quantity insufficient to produce a stable emulsion), and an auxiliary H_2O-immiscible solvent, *e.g.*, benzine, C_6H_6, turpentine, in quantity insufficient for complete dissolution of the wax, but $\nless$ 25 wt.-% thereof. S. S. WOOLF.

Plasticisers. SELDEN CO., Assees. of A. O. JAEGER (B.P. 359,164, 26.9.30. U.S., 28.9.29).—Non-resinophoric esters of keto-aromatic acids, *e.g.*, Me benzoylbenzoate, are claimed as plasticisers or softeners for plastic compositions, *e.g.*, cellulose ester or ether compositions, synthetic resins, polymerised styrene, etc., in the presence, if desired, of esters of dibasic acids, *e.g.*, phthalates. S. S. WOOLF.

Production of urea-formaldehyde condensation products. SOC. ANON. LA RONITE (B.P. 359,858, 13.3.31. Fr., 4.11.30).—A mixture of urea or a derivative thereof and CH_2O or other substances reacting as aldehydes, together with $>$ 15%, preferably 60% (on the wt. of aldehyde), of an alkaline-earth chloride, *e.g.*, $CaCl_2$, is kept in the cold for, say, 6 hr., boiled for a short period, *e.g.*, ½ hr., acidified, boiled again for about 4 hr., and finally poured into cold water. Improved dispersion with consequent plasticity is claimed. S. S. WOOLF.

Manufacture of [urea-formaldehyde] condensation products. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 359,653, 16.9.30).—H_2O-sol. urea-CH_2O "combinations," *i.e.*, various derivatives or polymerides, are heated at 100—110° with a practically anhyd. org. solvent containing OH groups, *e.g.*, mono- or poly-hydric aliphatic or aromatic alcohols, in a closed vessel in the presence of 10—30% (on the wt. of urea-CH_2O) of an inorg. substance capable of removing H_2O from the reaction mixture, *e.g.*, $CaCl_2$, $Ca(NO_3)_2$. S. S. WOOLF.

Solutions comprising synthetic resins. H. WADE. From BAKELITE CORP. (B.P. 358,898, 14.5.30).—Thiourea, replaced partly by urea if desired, is condensed with anhyd. CH_2O, or a substance yielding it, in the presence of a monoalkyl ether of ethylene glycol, *e.g.*, Cellosolve, and an alkyl (Et) lactate; other synthetic or natural resins may be incorporated. S. S. Woolf.

[Thermoplastic] compositions suitable for dentures. H. Wade. From Bakelite Corp. (B.P. 359,424, 13.6.30).—PhOH (6 mols.) is caused to react with excess of aq. CH_2O (9 mols.) or the equiv. amount of anhyd. CH_2O, *e.g.*, paraformaldehyde, in the presence of a basic condensing agent, *e.g.*, Na_2CO_3, the mass is acidified with $H_2C_2O_4$ or an org. acid of equiv. strength, before reaching a gelation stage, and the resulting mixture of resin, H_2O, and insol. salts is dehydrated by heating to 125°. S. S. Woolf.

Synthetic resinous complexes and their production. I. Rosenblum (U.S.P. 1,809,570 and 1,808,716, [A] 9.6.31, [B] 2.6.31. Appl., [A] 31.1.29, [B] 14.6.29).—(A) A (fusible sol.) phenol–aldehyde condensation product is prepared in the presence of a high-mol. org. salt of a suitable metal, especially Zn abietate, and of a cracked resin (wood rosin). After removal of H_2O the mass is treated with sufficient excess of a polyhydric alcohol (glycerol) to form partial (mono- or di-) resin esters, and is then further heated until a permanently sol., fusible resin is obtained. (B) Ordinary rosin or other natural resin is used in place of a cracked rosin, and fatty oils or acids, coumarone, etc. are mentioned as additional solvents in the first stage. The products are neutral (acid val. $<$ 10) and suitable as varnish resins. E. Lewkowitsch.

Synthetic resins and their application. E. I. Du Pont de Nemours & Co. (B.P. 359,365, 25.3.31. U.S., 25.3.30).—A drying or semi-drying oil, *e.g.*, linseed, soya-bean oil, is bleached by heating to 260—290° in the absence of O_2, and alcoholised by heating with a polyhydric alcohol, *e.g.*, glycerol. The product is then heated with a polybasic acid or anhydride, *e.g.*, phthalic anhydride, giving pale, transparent, non-yellowing resins. S. S. Woolf.

Manufacture of olefine polysulphide plastic compounds. J. C. Patrick (B.P. 359,000, 2.7.30. U.S., 19.9.29).—An olefine dihalide, *e.g.*, ethylene dichloride, is added to an aq. solution of a polysulphide (RS_n, where $R \equiv 2$ atoms of a univalent metal, 2 NH_4 radicles, or 1 atom of a bivalent metal, and $n = 3$ or more, *e.g.*, $CaS_{4\cdot 7}$, Na_2S_4) in the presence of a dispersing agent, *e.g.*, freshly pptd. $Mg(OH)_2$, an alkalinity at least equal to that of a saturated solution of $Mg(OH)_2$ being maintained. The fluid dispersion which settles from the latex-like product is washed repeatedly and coagulated by acidification, after compounding ingredients have been incorporated, if desired. S. S. Woolf.

Mouldable phenolic pentosan material. O. R. Sweeney, Assr. to Iowa State College of Agriculture & Mechanic Arts (U.S.P. 1,797,593, 24.3.31. Appl., 24.6.25. Cf. U.S.P. 1,797,559; B., 1932, 16).—Ground pentosan material, *e.g.*, corn cobs (100 pts.), is heated for 3 hr. at about 100° with a phenol, *e.g.*, cresol (60 pts.), and S_2Cl_2 or Sb chlorides (10 pts.); the black product after ageing for 48 hr. is ground, and may be hot-moulded and rendered H_2O-insol. by baking at 100° for several days. E. Lewkowitsch.

Products of high mol. wt.—See III. **Metalliferous azo dyes.**—See IV. **Synthetic resin products for textiles.**—See VI. **Lead sulphates.**—See VII. **Resinous soaps.**—See XII. **Chlorinated rubber.**—See XIV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Importance and determination of manganese content of [rubber] fillers and textiles. P. Kluckow and H. Siebner (Kautschuk, 1931, 7, 224—226).—The presence of Mn in materials for rubber manufacture is undesirable. For comparative purposes it is generally sufficient to determine sol. Mn as indicated by the permanganate formed when the powder, or the ash of a textile material, is heated for 5 min. with HNO_3 (d 1·2), a little aq. $AgNO_3$, and PbO_2. If the total Mn content is desired the Procter Smith method is suitable for the treatment of Fe oxide reds and fusion with alkali is preferable for kaolin and SiO_2. D. F. Twiss.

Vulcanisation [of rubber] with benzoyl peroxide. A. van Rossem, P. Dekker, and R. S. Prawirodipoero (Kautschuk, 1931, 7, 202—204, 219—224).—Vulcanisation at 140° of a 9 : 1 mixture of rubber and Bz_2O_2 is so rapid that substantially the same results are obtained after 10 min. and 120 min.; at 100° progressive vulcanisation is observable between 30 and 120 min.; at 80° vulcanisation was hardly detectable after 210 min. The above proportions give the best results; it is not possible to effect vulcanisation to a vulcanite stage; the common org. accelerators do not expedite vulcanisation with Bz_2O_2. Heat is liberated during the process, but this may arise from decomp. of part of the Bz_2O_2 and not from the vulcanisation process proper; a considerable proportion of the Bz_2O_2 can be extracted subsequently as free BzOH. No CO_2 is set free, and it is probable that the mechanism of vulcanisation involves a dehydrogenation of the rubber mols. with consequent bridge formation, and possibly also attachment of the Bz radical, at the H atom of the CH:CMe group. If S is also present Bz_2O_2 accelerates vulcanisation by the former at 120°, but not at 147°, whereas BzOH retards the action of S on rubber. Rubber which has been vulcanised with Bz_2O_2 can be vulcanised further by the subsequent addition of S. At 70° rubber vulcanised with Bz_2O_2 rapidly becomes soft and sticky; the presence of an antioxidant effects some improvement. D. F. Twiss.

Kinetics of vulcanisation of rubber. H. Loewen (Kautschuk, 1931, 7, 227—228; cf. B., 1930, 1122).—Nordlander's argument (*loc. cit.*) in favour of $S\mu$ as the form of S active in vulcanisation is contrary to some of the facts. D. F. Twiss.

Kinetics of vulcanisation of rubber. B. W. Nordlander (Kautschuk, 1931, 7, 228—231; 1932, 8, 13—15). H. Loewen (*Ibid.*, 15—16; cf. preceding abstract).—Polemical. D. F. Twiss.

Rosin and rosin oil in rubber and reclaimed rubber. H. A. Winkelmann and E. B. Busenburg (India-Rubber J., 1931, 82, 796—801).—The uses, methods of use, and literature are reviewed. It is important to discriminate between gum and wood rosins and between distilled rosin oil and blended rosin oil. Rosin produces softness and tackiness in rubber and also activates some accelerators of vulcanisation; rosin oil is used to soften rubber mixtures and to improve processing. Both rosin and rosin oil have long been used in the manufacture of reclaimed rubber to improve the physical properties and modify the working qualities; they are also of use in conjunction with alkali for the production of aq. dispersions of new or reclaimed rubber. D. F. Twiss.

Condition of rubber in solutions on the basis of their surface characteristics. B. Dogadkin and G. Pantschenkov (Kautschuk, 1931, 7, 198—202, 217—219).—After removal of capillary-active non-caoutchouc constituents such as proteins, fatty acids, and sugars, surface-tension experiments with a Rehbinder apparatus and a CO_2 atm. at 20° show that at the boundary of C_6H_6 solution and H_2O rubber is capillary-active up to 0·5%, but above 0·7% it becomes inactive; in the former solutions the rubber is probably present mainly in free colloidal mols. with hydrophilic double linkings, whilst in the latter the mols. form large complex aggregates in which only the hydrophobic Me radicals remain free. Below 0·5% concentration the viscosity of the solutions also follows the Einstein and Hagen–Poiseuille laws, but diverges therefrom at higher concns. At the interface C_6H_6–H_2O, rubber, probably on account of the length of its mol., does not form a compact unimol. layer and mol. aggregation appears to precede institution of the adsorption equilibrium. Rubber is capillary-inactive in C_6H_6 solution relative to air or CO_2 up to 0·5% concn., and even at higher concns. its influence is only slight, probably because of its marked solvation. D. F. Twiss.

See also A., Dec., 1421, **Elasticity of gutta-percha hydrocarbons.**

Patents.

Manufacture of rubber. T. Midgley, jun., C. A. Thomas, and C. A. Hochwalt, Assrs. to Gen. Motors Corp. (U.S.P. 1,806,547, 19.5.31. Appl., 22.12.27).—The tensile strength of vulcanised rubber is dependent on the presence of an amino-acid, $(C_{10}H_{17}O_2N)_n$, in the natural product. By introducing into raw or unvulcanised rubber a suitable amino-acid, *e.g.*, α-amino-octoic or -stearic acid, increased strength may be obtained in the vulcanised product. D. F. Twiss.

Modification of vulcanisable material [*e.g.*, rubber]. W. A. Gibbons, Assr. to Naugatuck Chem. Co. (U.S.P. 1,807,031, 26.5.31. Appl., 11.3.27).—When rubber latex is heated above 100° for 2—3 hr. with substantial maintenance of its content of H_2O, the rubber subsequently obtained, *e.g.*, by spray-drying, has an increased degree of softness. D. F. Twiss.

Rubber-treating processes. (A, B) C. E. Bradley and (A) C. Ferrettie, Assrs. to Mishawaka Rubber & Woolen Manufg. Co. (U.S.P. 1,805,712—3, 19.5.31. Appl., [A] 8.12.25, [B] 30.6.28).—(A) Rubber is soaked in water, *e.g.*, for 24 hr. at 80°, and, after sheeting, subjected to live steam, *e.g.*, under 25—50 lb. pressure for 1—2 hr. The finally dried product has much greater plasticity than the original material. (B) Thoroughly moistened rubber is subjected to the joint action of air and steam, *e.g.*, for ½—1 hr. with steam at 135° and air at 10 lb. pressure. The softened rubber is then dried by reducing the total pressure to about 2 lb. and injecting steam at approx. 150°. D. F. Twiss.

Manufacture of articles of rubber and fibrous material. E. Hopkinson and W. A. Gibbons, Assrs. to New York Belting & Packing Co. (U.S.P. 1,805,245, 12.5.31. Appl., 8.6.25).—An article of fabric and rubber integrally united, *e.g.*, seamless rubber textile hose, is produced by exposing a surface of a tubular body of fibrous material to an aq. dispersion of rubber, and withdrawing water through the material until a desired thickness of solid deposit has collected on the surface. The rubber-coated fabric is then dried and vulcanised. D. F. Twiss.

Curing [vulcanisation of rubber] tyres and the like. H. R. Minor, Assr. to Liquid Carbonic Corp. (U.S.P. 1,808,428, 2.6.31. Appl., 24.6.27).—Rubber articles are vulcanised in contact with an expansible bag filled initially with CO_2 under pressure, the pressure being maintained subsequently by a heated condensible gas such as steam, alone or mixed with an inert gas. D. F. Twiss.

Reclaiming of vulcanised rubber. M. Omansky, Assr. to A. D. Little, Inc. (U.S.P. 1,807,930, 2.6.31. Appl., 12.3.28).—Alkali-reclaimed rubber when treated with an acidic substance capable of effecting oxidation, *e.g.*, with $< 2\%$ of H_2SO_4, is greatly improved in electrical insulating properties. Plasticised new rubber may be introduced before or after the treatment. D. F. Twiss.

Rubber composition and method of preserving rubber. W. L. Semon, Assr. to B. F. Goodrich Co. (U.S.P. 1,808,578, 2.6.31. Appl., 17.1.30).—A halogen-substituted diarylamine, *e.g.*, *p*-chlorophenyl-β-naphthylamine, is applied as an antioxidant for rubber. D. F. Twiss.

Manufacture of aqueous rubber dispersion. R. A. Crawford, Assr. to B. F. Goodrich Co. (U.S.P. 1,806,388, 19.5.31. Appl., 6.8.27).—Masticated rubber is mixed with a small proportion of a peptising agent, such as K oleate, and, during continued mastication, an aq. alkaline solution, *e.g.*, aq. NH_3, is slowly added until the rubber becomes the dispersed phase. A nitrogenous protective colloid, *e.g.*, 1% of casein together with 1% of gelatin, is then introduced as stabiliser. D. F. Twiss.

Manufacture of clear chlorinated rubber solutions. N. Boehmer (U.S.P. 1,807,616, 2.6.31. Appl., 19.4.24).—Chlorinated rubber, especially the product of chlorination under pressure, after being washed with water and dissolved in a suitable solvent, *e.g.*, C_6H_6–$COMe_2$, is treated with CaO. The neutralised solution is allowed to settle and is then useful for varnishes, enamels, etc. D. F. Twiss.

Machines for plasticating materials [rubber]. Farrel-Birmingham Co., Inc. Assees., of W. A. Gordon (B.P. 362,280, 16.3.31. U.S., 19.4.30).

[Balls for] grinding.—See I. **Artificial leather. Fibrous products.**—See V. **Abrasive articles.**—See VIII. **Olefine polysulphide plastics.**—See XIII.

XV.—LEATHER; GLUE.

Tannin extracts during the past year. W. Vaskovich (Collegium, 1931, 615—625).—Typical analyses of a no. of tanning materials and extracts are compared for the years 1925—30. D. Woodroffe.

Tannins and solutions containing tannins. T. Fasol (Collegium, 1931, 610—615).—For the evaluation of weak tannin solutions the tannin is pptd. with freshly ignited MgO, filtering, and determining the sol. matter (the non-tans) in an aliquot portion of the filtrate. A correction is necessary for the dissolved MgO, which is made by deducting the ash of the dry residue from the evaporated filtrate. The non-tans figure thus obtained was lower than that obtained by a "filter-bell" tannin analysis of the liquors and diminished as the amount of MgO used was increased. Glucose was removed from its solutions by treatment with MgO under similar conditions. The acid content of tan liquors has been determined by conductivity measurements and titration of the liquor with $0 \cdot 2N$-NaOH. The presence of strong and/or weak acids in the tan liquor is shown by the inflexions in the titration curves. D. Woodroffe.

Report of the International Commission on quantitative tannin analysis. J. G. Parker and E. Stiasny (J. Soc. Leather Trades' Chem., 1931, **15**, 544—547).—The extraction of tanning materials may be carried out in a Procter open extractor. Any kaolin may be used which complies with the purity specifications. Solutions of extracts should be well agitated during the cooling process. The contact method of filtration has been replaced by the Berkefeld filter-candle method or the Riess method (B., 1929, 567). In the former process a predried filter-candle is immersed in the tannin solution for 10 min., and the filtration commenced at a pressure of $\not>$ 150 mm. Hg, the first 250 c.c. of filtrate are rejected, and if clear to both transmitted and reflected light the next 50 c.c. are used in the determination of total sol. matter. Candles must be cleaned in $Na_2Cr_2O_7$ and H_2SO_4. The chroming and washing of the hide powder and detannisation may be carried out in a Darmstadt, Jamet, or other suitable apparatus. Colour measurements shall be made in a 1-cm. cell, using the Lovibond tintometer, and the results calc. to a solution containing $0 \cdot 5\%$ of tannin and expressed in terms of red, yellow, and black units. D. Woodroffe.

Hop tannin. H. Bilgram (Woch. Brau., 1931, **48**, 493—498).—The extract obtained from hops with boiling H_2O was pptd. with $Pb(OAc)_2$, the ppt. decomposed by H_2SO_4, and the process repeated on the filtrate. SO_4'' was removed from the filtrate by $Ba(OH)_2$, conc. and almost neutralised by Na_2CO_3. The tannin was pptd. by cinchonine acetate, the ppt. decomposed by AcOH, and the tannin purified by repeated alternate treatment with $Pb(OAc)_2$ and H_2SO_4. The tannin (yield $0 \cdot 08\%$), a brown unstable powder, is sol. in MeOH and $COMe_2$ and gives typical tannin reactions and phloroglucinol, protocatechuic acid, and glucose as decomp. products. F. E. Day.

Patents.

Treatment of fur skins. E. Beeley (B.P. 359,957, 28.7.30).—The skins are treated for 1 hr. or more with a soap solution, *e.g.*, a 2% solution of a soap containing ethylene trichloride, chrome-tanned, and subsequently dyed at 100°. D. Woodroffe.

Manufacture of compounds of phenol[s] and formaldehyde for tanning, cleansing, and other uses. W. W. Triggs. From Röhm & Haas Co. (B.P. 356,105, 20.5.30).—A phenol-CH_2O condensation product is condensed with an unsaturated fatty acid, preferably above C_9, *e.g.*, oleic acid, and the resinous product is sulphonated, *e.g.*, with oleum, conc. H_2SO_4, or $ClSO_3H$, to give a tanning agent. C. Hollins.

Methods of tanning. United Shoe Machinery Corp., Assees. of M. M. Merritt (B.P. 361,344, 12.8.30. U.S., 24.10.29).—The skins to be tanned are struck out to remove as much H_2O as possible, stretched, and while in this condition are treated on one or both sides with a conc. tanning solution or with a fabric layer impregnated with the tanning agent. When the grain has become fixed by the tanning agent, the tannage of the skin may be completed by drumming in tan liquors. D. Woodroffe.

Making of sheet material from fibres produced from hide or skin. Soc. Invenzioni Brevetti Anon. Torino, Assees. A. Mackay (B.P. 360,017, 29.7.31. U.S., 29.11.29.)—Waste hide or leather pieces are disintegrated and then suspended in H_2O, to which a tanning agent and grease, and subsequently a binding agent, *e.g.*, latex, are added. The latex is pptd. and the mass felted, and the sheet produced may be superimposed on one or more sheets with a layer of interposed adhesive material. D. Woodroffe.

Manufacture of vegetable glue. I. F. Laucks and G. Davidson, Assrs. to I. F. Laucks, Inc. (U.S.P. 1,805,773, 19.5.31. Appl., 23.9.27).—The glue comprises soya-bean flour treated with, *e.g.*, NaOH, CS_2, $Ca(OH)_2$, an alkali salt (Na silicate), and $CuSO_4$, in the presence of H_2O. (Cf. U.S.P. 1,689,732; B., 1929, 141.) L. A. Coles.

Adhesives [from cellulose derivatives]. W. Stelkens (B.P. 361,317, 12.8.30. Ger., 12.8.29).—The products comprise a "frame substance" (*e.g.*, waste celluloid, pyroxylin, cellulose acetate), a filler (*e.g.*, low-viscosity nitrocellulose), and a solvent (*e.g.*, $COMe_2$, EtOAc, Me glycol); they may be used, *e.g.*, in the form of a film. L. A. Coles.

[Waterproof and heat-resisting] adhesive. F. B. Dehn. From C. H. Parker Co. (B.P. 361,592, 12.11.30).—A mixture of, *e.g.*, 16 lb. of shellac gum, 8 lb. of Pontianak gum, 2 lb. of TiO_2, 22 lb. of asbestine, and 22 lb. of EtOH is claimed. L. A. Coles.

Products of high mol. wt.—See III. **Artificial leather. Cutting gelatin films.**—See V. **Carroting furs.**—See VI. **Uniting wood.**—See IX. **Gelatin for food.**—See XIX.

XVI.—AGRICULTURE.

"Blue sand" and marsh soils. Clausen (J. Landw., 1931, **79**, 311—322).—The ameliorative effect of "blue sand" on marsh soils is due to the physical action of its sand and $CaCO_3$ contents. A. G. Pollard.

Physical chemistry of cultivated soils. VI. Comparison of the "amalgam" process with the Neubauer method. R. A. Herzner (Z. Pflanz. Düng., 1931, 23A, 68—76; cf. B., 1931, 453).—In the author's method for examining soils by electrodialysis, using a Hg cathode, the increased sol. P in the anode chamber resulting from increased acidity as the bases are removed is a characteristic val. for each soil. The "amalgam" process yields vals. for available K which

show a general numerical agreement with those of Neubauer's method. The P vals. show a general relative agreement, but, numerically, the " amalgam " method figures are 2—5 times as high as Neubauer's.
A. G. Pollard.

Curtailing the Neubauer seedling test. R. Dietz (Ernähr. Pflanze, 1931, **27**, 429—432). H. Neubauer (*Ibid.*, 449).—This test for determining the nutrient val. of soil may be expedited by the continuous use of artificial light.

In a reply to the above the author considers it doubtful if possible advantages attaching to the use of artificial light are sufficiently definite to compensate for added complexity of technique. A. G. Pollard.

New methods for examination of organic matter in soil and their application to soil types and humus material. II. U. Springer (Z. Pflanz. Düng., 1931, **23A**, 1—40 ; cf. B., 1931, 1110).—The AcBr method for humus examination is modified by washing the extracted residue with $KHSO_4$ solution instead of Et_2O. Intermediate " humin acids " are thus removed and results are lower than by the original method. In the colorimetric method for determining humus the usual extraction with 5% Na_2CO_3 solution is supplemented by a second extraction with 5% NaOH solution. By this means the max. humification and the ratio total humus : " humin " acids are determined. In well-decomposed humus soils the acid oxidimetric method gives vals. for humus which are higher than, though in the same relative order as, those obtained by alkaline oxidation. A system of soil classification is described in which the humus of the various horizons is characterised by means of the degree of decomp., humification no., colour no., O val., and Cl val. (cf. B., 1928, 619). Given suitable chemical, physical, and biological conditions, the C : N ratios of normal soils tend to attain the val. 10 : 1. High decomp. and humification vals. are shown by black-earth (steppe) soils, humus soils containing $CaCO_3$, and low-moor soils of good physical condition. Low decomp. and humification vals. are characteristic of podsols, degraded brown earths, and other types in which bacterial activity is low. Peats and crude humus soils have low decomp. and moderately high humification vals. In such soils poor aeration, unsatisfactory moisture condition and acidity tend to limit bacterial activity and anaerobic processes predominate. Good decomp. and poor humification are shown by highly-degraded forms of black earths, by humus soils containing $CaCO_3$, and by neutral and chalk-bearing brown earths. For the calculation of the humus content of soils from the total C content, the factor 1·724 is too low for soils of low decomp., *e.g.*, podsols, which contain a considerable proportion of cellulose and hemicellulose of relatively low C content. Where decomp. and humification vals. are high the factor gives satisfactory results provided the removal of plant roots from samples is thorough. Sieving with a 0·25-mm. sieve must be substituted for the customary 2-mm. mesh. A. G. Pollard.

Ion exchange in peat. W. U. Behrens and I. M. Robertson (Z. Pflanz. Düng., 1931, **23A**, 50—57).—The proportion of cations adsorbed by acid sphagnum peat from neutral salt solutions bears no relation to that of the H ions displaced. Some cases of negative adsorption are recorded. Ion exchange depends on the concn. of the solution used and on the nature of both ions. The relative equiv. displacement of anions from peat decreases with rising concns. of solutions used and, with a series of K salts of equiv. concn., decreased in the order SO_4'', ClO_3', Cl', I', PO_4''', CNS'. The corresponding exchange acidities developed increased in the order of K salts : CNS', ClO_3', I', Cl', SO_4''. The withdrawal of anions from peat by solutions of metallic chlorides decreased in the order Li, Na, Ca, K, Mg, H, and the corresponding exchange acidities produced increased in the order Li, Na, Mg, K, Ca. The phenomena are explained on the basis of a Donnan equilibrium between adsorbed and dissolved ions. A. G. Pollard.

Determination of the acid status of soils by Trénel's electrometric method and the colorimetric method of Kühn and Scherff. S. Goy and O. Roos (Z. Pflanz. Düng., 1931, **23A**, 63—68).—In Kühn and Scherff's method the personal error is considerable ; also the small amount of soil used may lead to wide sampling errors and to rapid changes in the p_H of the sample during handling in the laboratory.
A. G. Pollard.

Nature of soil buffer action. L. D. Baver (J. Amer. Soc. Agron., 1931, **23**, 587—605).—The buffering of soils containing different amounts of the same type of colloid increases with the colloid content, whilst with the same amount of different colloids there are differences due to variations in the nature of the colloid. Buffering due to org. matter takes place only in slightly acid, neutral, or alkaline reactions. Extraction of sol. Al_2O_3, Fe_2O_3, and SiO_2 does not materially affect the buffering of soil colloids. The buffer action of soil depends primarily on the inorg. colloidal clay acids, and is due to equilibria between these acids and their salts as affected by hydrolysis, dissociation, and solubility phenomena. Chemical Abstracts.

Solubility of [soil] potassium in hydrochloric acid extractions by the Ganssen and the van Bemmelen–Hissink methods. W. Lesch (Z. Pflanz. Düng., 1931, **23A**, 57—62).—Small differences in the results of the two methods examined are traceable to differences in the time required for the acid to attain the const. b.p., but the principal divergence is associated with the different ratios of soil : acid used. On this ratio the solubility of soil K is mainly dependent. Differences in the method of boiling, *e.g.*, in covered beaker or under reflux, are of little significance. Hissink's method (soil : acid = 1 : 10) yields the same vals. for K as the Lemmermann–Fresenius process for determining the " total " K by boiling with aqua regia. Ganssen's method yields persistently lower results than that of Hissink. A. G. Pollard.

Soil analysis. G. Várallyay (Mezög. Kutat., 1931, 4, 110—115 ; Chem. Zentr., 1931, i, 3274—3275).—Acceptable methods for the determination of CaO requirement are described. A. A. Eldridge.

Microbiological evaluation of lime and phosphate requirement of the soil. A. P. Kryuchkova (Trans. Sci. Inst. Fertilisers, Moscow, 1930, No. 76, 14—49).—Various amounts of P or Ca were added to soils prepared by Vinogradski's method and inoculated with definite numbers of *Azotobacter* ; by means of counts after 24 and 48 hr. the P_2O_5 or CaO requirement of the soil was determined. Podsol soils are first sterilised, since otherwise the butyric acid formed obscures the results. Alternatively, the plates are drained through a layer of charcoal, added at the bottom of the plate, and connected with the atm. by means of a tube.

Chemical Abstracts.

Rôle of aluminium in soils deficient in lime. M. Trénel (Ernähr. Pflanze, 1931, **27**, 385—389, 408—410).—Roots of trees injured by soil acidity contain more Al and less Ca than normally. A relationship exists between the Al content of such roots and the amount of Al extracted from the soil by neutral salt solutions. Removal of bases from permutites by electrodialysis leaves at first a mixture of Al_2O_3 and SiO_2 gels of variable composition, from which Al_2O_3 is slowly removed by continued dialysis. Exchange acidity depends on the extent to which the Al_2O_3–SiO_2 gel is dissociated into its constituents. Similar conditions obtain in soils. Plant injury in acid soils results not only from the presence of sol. Al, but also from nutrient deficiency due to the breakdown of the Al_2O_3–SiO_2 gel and the consequent loss of capacity for fixing nutrient ions. A. G. Pollard.

Determination of the anticipated effect of superphosphate on cereals by a relative method. L. Dworak (Z. Pflanz. Düng., 1931, **23A**, 40—50).—The anticipated yield increase (T_t) resulting from applications of superphosphate is given by the formula $T_t = F\sqrt{KM}$, where K is the concn. of H_2O-sol· PO_4''' in the soil and M the depth to which the fertiliser penetrates. F is a const. determined by field trials. The relationship is in agreement with results of field-cropping experiments. A. G. Pollard.

Fixation of phosphoric acid in soils. E. Blanck, F. Klander, and H. Keese (J. Landw., 1931, **79**, 293—310).—The fixation of soil phosphates by Ca, Fe, and Al salts in forms relatively unavailable to plants occurs only when these salts are present in quantities in excess of that of the sol. PO_4''' (*i.e.*, total added less that initially absorbed by the soil itself). Ca salts were the least active in this respect and the sulphates of Fe and Al had a much greater effect than the corresponding chlorides. Direct toxicity of the salts, in addition to their PO_4'''-fixing action, contributes to their crop-reducing effects. A. G. Pollard.

Potash manuring and water consumption. Arland (Ernähr. Pflanze, 1931, **27**, 445—449).—Applications of K manures reduced the H_2O consumption of barley, particularly during the flowering period.

A. G. Pollard.

Manuring of meadows. E. Müller (Ernähr. Pflanze, 1931, **27**, 373—377).—In field trials, K fertilisers increased the proportion of legumes in the herbage and decreased that of weeds. A. G. Pollard.

Green manuring. Anon. (Imp. Bur. Soil Sci. Tech. Comm., 1931, No. 22).—A comprehensive *résumé* of the literature on this subject is given together with a bibliography of 437 references. A. G. Pollard.

Nitrogen fertilisation of cereals. H. Hanisch (Forts. Landw., 1931, **6**, 154—156, 190—193 ; Chem. Zentr., 1931, i, 3576—3577).—With rye, wheat, and barley the N absorption is completed in the early weeks of growth ; with oats it is spread over a longer period, being greatest during flowering. Hence with oats less sol. N fertilisers may be used. Unfavourable effects on the grain quality by high applications of N are observed only with malting barley. A. A. Eldridge.

Effect of nitrogenous fertilisers on the growth and yield of wheat and barley. A. E. V. Richardson and E. F. Fricke (J. Dept. Agric. S. Australia, 1931, **35**, 57—86).—Applications of N to wheat following another cereal increased the number of ear-bearing tillers and the number of ears per plant at harvest. In this respect dressings applied at sowing were more effective than when applied in spring. With barley, $(NH_4)_2SO_4$ increased the number of bearing tillers. Dressings of 1 cwt. per acre and upwards increased the N content of grain and straw and reduced the malting val. of the grain. With increasing proportions of N fertiliser, the total N per acre removed by the crop was approx. proportional to that applied. A. G. Pollard.

Effectiveness of nitrogenous fertilisers [for cotton]. D. V. Charkov and M. I. Liakhov (Cotton Independence, Russia, 1931, No. 3, 60—66).—In Middle Asiatic conditions 90 kg. N per hectare are more profitable than 60 kg. The order of diminishing efficiency is : NH_4NO_3, $(NH_4)_2SO_4$, oil meal, urea, $CaCN_2$.

Chemical Abstracts.

Optimum period for application of nitrogen fertilisers in cotton culture. V. N. Mandruigin (Khlopk. Delo, 1930, **9**, 288—294).—In Middle Asia formation of NO_3' from org. N fertilisers is rapid in early summer. N fertilisers (preferably mineral) are best applied to cotton after blooming. Chemical Abstracts.

Effect of soil types and fertilisers on yield and quality of fibre flax. B. B. Robinson and R. L. Cook (J. Amer. Soc. Agron., 1931, **23**, 497—510).—Application of N, K_2O, and P_2O_5 fertilisers to the lighter soils did not afford yields of fibre equal to those from untreated heavier soils ; the yield of seed was slightly increased. The bad effect of Ca on quality of fibre and % of fibre in the straw is counteracted by simultaneous application of Mg. Chemical Abstracts.

Effect of carbon dioxide increase on growth in the sugar beet. Z. I. Zhurbitski (Ann. Acad. Agron., Petrovsk, 1928, No. 2, 427—444).—Increase in root, sugar, leafage, and root : leaf ratio was obtained.

Chemical Abstracts.

Time of application of fertilisers for sugar beet and potatoes. A. G. Mikhalovski (Udobr. Urozhai, 1931, **3**, 227—229).—With beet the effect of N (preferably before planting) is not increased by simultaneous application of P, K, or P and K. K fertilisers, when applied late in the vegetative stage, considerably diminish the yield, but do not affect the sugar content ; P fertilisers increase the sugar content during most of the vegetative period except towards the end.

Chemical Abstracts.

Effect of potash manuring on the colour, state, and storage quality of fruit. E. Stägmeyr and V. Reinecke (Ernähr. Pflanze, 1931, **27**, 377—379).—Application of K fertilisers to orchards improved the keeping quality, flavour, and aroma of pears.

A. G. Pollard.

Production of soda and potassium nitrate fertiliser from sylvinite. V. S. Yatlov (J. Chem. Ind., Russia, 1930, 7, 752—759).—The effect of various quantities of NH_3 and CO_2 on the composition of solutions containing KCl, NaCl, and NH_4Cl was examined.

Chemical Abstracts.

" Sebbach el Kom " or " Kufri " as a fertiliser in Egyptian agriculture. P. Vageler (Ernähr. Pflanze, 1931, 27, 365—371).—The value of this material as a fertiliser and ameliorant depends on its contents of P and KNO_3. Treatment of difficultly-working soils with K salts increases the capillary rise of water, whereas Na salts produce considerable deterioration in physical condition.

A. G. Pollard.

Comparative effects of manure and mineral fertilisers. D. N. Prianischnikov (Trans. Sci. Inst. Fertilisers, Moscow, 1930, No. 73, 61—88).—Mineral fertilisers were superior to manure, which, however, improves the physical condition and the buffer capacity, and increases the CO_2 production of the soil. Rothamsted and Danish (Askov) experiments are criticised.

Chemical Abstracts.

Acidimetric determination of phosphorus in phosphate [fertilisers]. M. L. Cheplevetzki and S. I. Pozdnyakova (Udobr. Urozhai, 1931, 3, 262—269).—Volumetric methods are compared. In Pemberton's method a large excess of alkali must not be used in the dissolution of the NH_4 phosphomolybdate, and the ppt. must not be washed excessively with KNO_3. In Koltoff's oxalate method the error is 2—3%.

Chemical Abstracts.

Decomposition of green manures grown on a soil and turned under compared to the decomposition of green manures added to a fallow soil. N. R. Smith and H. Humfeld (J. Agric. Res., 1931, 43, 715—731).—A microbiological greenhouse study of the decomp. of green rye and green vetch tops grown elsewhere and *in situ* and turned under limed and unlimed clay loam high in nitrates is made. The immediate effect of adding these green manures to the limed fallow soil was to increase bacterial numbers and cause a decrease in the nitrate-N content of the soil. Bacterial numbers fell to the initial level after 4 days, the nitrate-N content rising to a max. after 1 week and falling to its initial level or lower after 56 days. On the unlimed fallow soil this relationship was observed with vetch but not with rye. When the crops were grown *in situ* and turned under, the number of bacteria was greatly increased on the limed soil and remained high for 3 weeks, during which time the nitrate-N steadily increased. On the unlimed soil only rye caused a marked increase, but this was not accompanied by a loss of nitrate-N. Both in the presence and absence of CaO, fungi were more numerous under the growing crops than in the fallow soil, and turning-in the green manures did not affect the numbers. The p_H vals. of the limed and unlimed soils were barely changed by any of the treatments. During the early stages of decomp. both in the limed and unlimed soil a direct relationship was observed between bacterial numbers and CO_2 production.

W. G. Eggleton.

Studies of lignin in wheat straw with reference to lodging. M. Phillips, J. Davidson, and H. D. Weihe (J. Agric. Res., 1931, 43, 619—626).—Lodged stalks of wheat fertilised with $NaNO_3$ contained more OMe and lignin than did stalks of unlodged wheat receiving no fertiliser. With early application of $NaNO_3$ the % lignin seemed to be directly related to the amount of fertiliser applied, but even excessive dressings at heading time did not affect the % lignin in the straw. The ash content was higher in the stalks of young plants receiving $NaNO_3$ than in those not so treated, a relationship which was reversed in the later stages. $NaNO_3$ caused a decrease in the SiO_2 content of the straw, a result which supports the view that lodging is caused by SiO_2 deficiency in the straw.

W. G. Eggleton.

Control of weeds with chlorates. J. W. Deem (New Zealand J. Agric., 1931, 43, 105—110).—Unsatisfactory results from the use of $NaClO_3$ sprays for weed control may result if the solution is too conc. Plants so treated appear to harden and the sap is unable to take up the salt and convey it to the roots. Best results were obtained with 3—10% solutions of $NaClO_3$.

A. G. Pollard.

Weeds in lawns and greens; control by treatment with chemical sprays. R. B. Levy and E. A. Madden (New Zealand J. Agric., 1931, 42, 406—421).—Solutions of As_2O_5 (1 : 80) showed high differentiation in killing between grasses and weeds, and after spraying reverted to a non-injurious form. In comparison, 2½% solutions of $NaClO_3$ caused a slower recovery of grasses and encouraged an undue return of clover.

A. G. Pollard.

Control of " stinking " smut or bunt. R. L. Twentyman (J. Dept. Agric. Victoria, 1931, 29, 201—208, 235—248).—Dry-pickling of seeds with Cu preps. does not affect their germination, gives satisfactory protection against reinfection, and produces appreciably better grain-yield increases than the wet process. With very heavily smutted seed wet-pickling gave rather better control. The efficiency of Cu pickling powders increases with the fineness of division. The 200-mesh sieve is insufficient to give adequate tests of fineness. The apparent density of the powders gives more reliable information. Dilution of Cu dusts with an inert material reduces their efficiencies according to the extent of the dilution.

A. G. Pollard.

Ecology and control of slugs. H. W. Miles, J. Wood, and I. Thomas (Ann. appl. biol., 1931, 18, 370—400).—$CuSO_4$, Na_2CO_3, and creosote are definitely lethal to slugs, but the efficiencies of these substances vary with the nature of the soil and the method of application. Slugs are preferably dealt with by means of repellents, among which a 0·1% solution of $HgCl_2$ and a creosote–$CaCO_3$ mixture (1 : 1000) give good results.

A. G. Pollard.

Destruction of *Alectorolophus* with kainite. Fürst (Ernähr. Pflanze, 1931, 27, 390—393).—Applications of 10—14 dz. per hectare of kainite destroyed over 95% of the weed in pasture and among cereal crops.

A. G. Pollard.

Gout fly prevention. W. Acker (Ernähr. Pflanze, 1931, 37, 452—454).—Small applications of sol. K fertilisers (48 kg. per hectare) increased the resistance of barley to damage by the gout fly. A. G. Pollard.

Chlorosis in yellow lupins. R. Reincke (Z. Pflanz. Düng., 1931, 23A, 77—104).—Neither soil acidity, buffer power, K- nor P-deficiency is the immediate cause of chlorosis. The action of CaO in chlorosis is not localised in the soil, but is initiated within the plant system and in organs other than the affected leaves. The small Fe content of chlorotic leaves is probably due to restricted transport from old to younger leaves induced by Ca. No fixation of Fe in the seed leaves was observed. N in the presence of CaO intensifies chlorosis. A. G. Pollard.

See also A., Dec., 1466, **K absorption by plants.**

Patents.

Manufacture of a fertilising agent by the wet oxidation of coal and the like. M. F. Carroll, and A. Boake, Roberts & Co., Ltd. (B.P. 361,890, 23.6.30).—Peat, lignite, coal, etc. is treated with excess HNO_3 at about 100° until the product is nearly all sol. in alkali and the oxides of N expelled are converted by the usual method into HNO_3 for re-use. L. A. Coles.

Production of mixed fertilisers. A. Mentzel (B.P. 361,267, 14.5.31. Ger., 14.5.30).—NH_3 liquor is saturated with CO_2 to such a degree that pptn. of $(NH_4)HCO_3$ just fails to take place, and is then mixed with saturated $(NH_4)_2SO_4$ solution, gaseous CO_2 and NH_3 being passed into the mixture and the temp. maintained at 25°. After pptn. of $(NH_4)_2SO_4$ and $(NH_4)HCO_3$, the mother-liquor may be continuously treated with $(NH_4)_2SO_4$ solution, NH_3, and CO_2. W. J. Wright.

Manufacture of mixed fertilisers. Patentverwertungs A.-G. "Alpina" (Soc. Anon pour l'Exploit. de Brevets "Alpina"; or Patents Exploitation Co. "Alpina," Ltd.) (B.P. 360,908, 1.7.30. Ger., 10.7.29).—Hardening of mixed fertilisers containing NH_4NO_3 is prevented by adding 10—30% of $Ca(NO_3)_2$, $CaCl_2$, or $Fe(NO_3)_3$. W. J. Wright.

Manure mixtures. Kali-Forschungs-Anstalt G.m.b.H. (B.P. 362,069, 30.9.30. Ger., 23.10.29).—The mixtures comprise 3·5 pts. of KNO_3 and 1·5 pts. of NH_4MgPO_4,H_2O, together, if desired, with other compounds containing K, P, or N. L. A. Coles.

Dressing seed grains. I. G. Farbenind. A.-G. (B.P. 360,723, 19.12.30. Ger., 19.12.29. Addn. to B.P. 360,136; B., 1932, 75).—A derivative of C_6H_6 (or homologue or substitution product) containing at least 3 halogen and 1 NO_2 group in the mol., *e.g.*, $C_6HCl_3(NO_2)_2$, is used, in admixture with talc etc. and/or a wetting agent if desired. E. Lewkowitsch.

Planting of seed and manufacture of blocks or briquettes containing seeds. W. W. Triggs. From Internat. Skogplantningsmetode Aktieselskap (B.P. 362,226, 2.2.31).—An endless chain of moulds passes through apparatus in which the moulds are charged with a mixture of crushed charcoal and loam, with the addition, if desired, of straw, hair, etc., and the mixture is then compressed in stages and drilled to receive a seed and supply of soil; after removal from the moulds, the blocks are, *e.g.*, dipped in molten paraffin wax to render them more durable. L. A. Coles.

[Solid] insecticides. Imperial Chem. Industries, Ltd., J. Savage, F. Holt, and R. Thomas (B.P. 361,421, 23.8.30).—A liquid and a solid insecticide, preferably $C_6H_4Cl_2$ (*o*- and *p*-), are heated with a vulcanisable oil (*e.g.*, raw linseed oil, herring oil) and S_2Cl_2 until the mixture sets to a hard mass, which is cooled and ground. L. A. Coles.

NH_4HCO_3.—See VII. **Impregnation of uncut trees.**—See IX.

XVII.—SUGARS; STARCHES; GUMS.

Beet marc. I. O. Kopecký (Z. Ver. deut. Zucker-Ind., 1931, 81, 447—486).—The natural marc, as it exists in beet tissue, is best determined as "cold-water marc," by rupturing all the cells, centrifuging, and washing out the sugar with cold H_2O. In a procedure on these lines, 5 g. of beet were ground with a little H_2O for ½ hr., transferred to a special, thick-walled, 30-c.c. pyknometer, centrifuged in the latter for 10 min. at 9000 r.p.m. to render the marc compact, transferred to a filter, washed with cold H_2O until quite free from sugar, re-transferred to the pyknometer, centrifuged, and weighed at 20° after topping-up with H_2O. The marc was next washed on a filter with 20% sucrose solution, re-transferred to the pyknometer, and weighed again, this time in 20% sugar solution. From the wts. of the pyknometer when empty and also when containing H_2O alone, sugar solution alone, marc in H_2O, and marc in sugar solution, the wt. and vol. of the marc were calc. In many cases this cold-water marc was subsequently washed on a filter for 1 hr. with H_2O at 85—90°, and weighed twice as before, to obtain vals. for the "hot-water marc"; and in some cases it was washed in succession with hot H_2O, EtOH, and Et_2O and reweighed as before. The average of 33 determinations of cold-water marc, made on 5 stored beets, indicated 6·542 wt.-%, *d* 1·343, and vol. 1·318 c.c. per 26 g. of beet. Individual data for 19 samples from one root showed, with some irregularities, a general fall from top to tail, max. 7·714 and min. 5·471%. A similar general trend was shown by the hot-water marc; individual vals. were in some cases lower and in others higher than those for the cold-water marc, but the average for the whole root was the same. The wt. of the hot-water marc after actual drying at 105° was about ¾ of the wt. calc. as described. With 8 samples from one root, successive extraction with hot H_2O, EtOH, and Et_2O removed a considerable amount of matter from the cold-water marc and raised its density, yielding average vals. of 4·862 wt.-%, *d* 1·467, and vol. 0·866 c.c. per 26 g. of beet. J. H. Lane.

Presence and control of sulphur dioxide in Natal raw sugars for export (Proc. S. Afr. Sugar Tech. Assoc., 1930, 60—76).—A report by a Committee of the Association. Amounts of SO_2 from 27 to 336 p.p.m. have been found in Natal raw sugars. In 23 factories visited, amounts of S from 4·29 to 40 lb. per ton of sugar were used for juice sulphitation, the SO_2 contents of the mixed juices ranging from 700 to 3350 p.p.m. The production of raw sugar containing < 70 p.p.m. from such juices demands very carefully controlled clarification of the juice, and also of the syrup, for most of the SO_2 in raw sugars is present in an insol.

form. The Committee make suggestions for factory procedure. Important points in milling control are: exclusion of frosted and drought-stricken canes, proper topping of canes, cleanliness in plant, and screening of the mixed juice to remove cush-cush. The mixed juice is heated to 60—71° and treated with such a quantity of CaO that when sulphited to 2500—3500 p.p.m. it will not be acid. About 90% of the total amount of CaO is added at first, and after sulphitation the juice is tempered with further CaO to p_{H} 8·3 and finally adjusted to p_{H} 7·4—7·8 by addition of H_3PO_4. It is then heated to 98° and set aside for 1¼—1½ hr. The clarified juice should have p_{H} 7·2, and only clear juice should enter the evaporators. Scums should be diluted as much as evaporator capacity will permit, and may be decanted if filter-press capacity is deficient. On no account should they be boiled. The decanted juice may join the main juice after the final tempering. The bottoms from the decanted scums may be further diluted and treated with CaO, but without heating; H_3PO_4 or kieselguhr may also be used and the material then filter-pressed. The juice from the presses should be returned to raw juice before sulphitation. Syrups should be kept at a density above 55° Brix, heated to 80°, and allowed to deposit suspended matters. They must not be acid at this point, but if more alkaline than p_{H} 7·2—7·3 they may be adjusted to this reaction by addition of H_3PO_4. The syrup bottoms, after settling, may be returned to the raw juice after its final tempering. If the lower grades of sugar are still high in SO_2 content, all molasses for reboiling should be diluted to 50—55° Brix, limed if necessary, boiled in blow-ups, skimmed, and subsided for 12—18 hr. The molasses bottoms should be re-treated and subsided and the final bottoms discarded. Treacle sugar may be remelted, treated with some CaO and H_3PO_4, heated to 90°, subsided, and mixed with the clear juice entering the evaporators; or small quantities of the sugar may be mixed with the tempered juice before heating.

J. H. Lane.

Loss in polarisation of Natal raw sugars on storage. L. Blacklock (Proc. S. Afr. Sugar Tech. Assoc., 1930, 105—107).—Cases of rapid deterioration have been traced to moisture contents in excess of those corresponding to the factor of safety (B., 1923, 111). Acid reaction and moist conditions of storage also promote deterioration. The practice of mixing sugars of low and high purities, after drying, to obtain a product of medium quality is strongly deprecated; mixing is never perfect, and migration of moisture from the low- to the high-grade sugar disturbs equilibrium and leads to fermentation and inversion.

J. H. Lane.

Sulphur dioxide content of Natal sugars. D. J. Coghill (Proc. S. Afr. Sugar Tech. Assoc., 1930, 52—59).—The sulphide-stain method of determining SO_2 in sugars (B., 1927, 312) is suitable for refined sugars and for others containing up to 25 p.p.m., but for larger amounts it becomes inaccurate, owing to the small quantity of sample employed and the difficulty of obtaining a small representative portion. Raw sugars have been found to contain scales of $CaSO_3$ which give rise to irregular results even on 100-g. lots. The method of direct iodometric titration, which is used by the author for routine purposes at the Natal Sugar Experiment Station, gives higher results than distillation with acid, raw sugars containing other iodine-reducing substances than SO_2. With a large number of sugars of all types from different factories it gave results in most cases up to 20 p.p.m. higher than those obtained by a slightly modified form of the Monier-Williams distillation method (Ministry of Health Rep., London, 1927). Most of these sugars contained less than 70 p.p.m. During storage of some samples in tightly-closed jars, rather variable rates of loss of SO_2 were noted, *e.g.*, a fall from 41·4 to 32·0 p.p.m. in 47 days, and from 114 to 33 p.p.m. in 163 days.

J. H. Lane.

Starch in cereals.—See XIX.

See A., Dec., 1366, **Starch–I reaction.** 1400, **Determination of lævulose.** 1401, **Synthetic cellulose from dextrose.**

Patents.

Saccharification and bacterial isolation of cellulose.—See V. **Adhesive.**—See XV.

XVIII.—FERMENTATION INDUSTRIES.

Influence of rice on beer yeast. M. Matsuyama (Woch. Brau., 1931, 48, 479—481).—Yeast was cultivated in malt and koji (rice saccharified by *Aspergillus oryzæ*) worts, and in three mixtures of these in varying proportions. The greatest cell increase occurred in mixtures containing 75% of malt wort, and the crop from this mixture had the highest fermenting, catalase, apozymase, and endotryptase activity. The yeast from the 50% mixture, which had the highest cozymase activity, was also in most respects better than that from malt wort alone.

F. E. Day.

Analysis of coloured malt. F. Kutter (Woch. Brau., 1931, 48, 475—479, 483—487).—The following modifications of the German standard methods are proposed: colour to be determined on a 1 : 20 dilution of an infusion of 50 g. of coloured malt made up to 500 g.; total extract by the use of diastatic malt extract instead of malt. The theoretical and practical advantages of the proposed alterations are discussed.

F. E. Day.

Measurement of the turbidity of "congress" worts by the nephelometer. B. Krause, H. Simon, and S. Iacobsen (Woch. Brau., 1931, 48, 498—499).—Reproducible measurements, independent of colour of the wort, light intensity, and temp. (15—30°), can be obtained with the Zeiss step-photometer and a special prism. The results indicate that in some cases direct visual observation is untrustworthy.

F. E. Day.

Hop tannin.—See XV.

See also A., Dec., 1455, **Determination of citric acid.** 1456, **Assay of pepsin.** 1457, **Effect of cyanide, etc. on fermentation by yeast preps.** 1458, **Inhibition of $COMe_2$–BuOH fermentation. AcOH from maize stalks. Lactic acid fermentation. Fixation of atm. N_2.**

Patents.

Composition for use in panary fermentation. J. W. Hawks (U.S.P. 1,808,108, 2.6.31. Appl., 17.12.27).

—Edible gelatin is intimately ground with a monobasic acid phosphate and a filler such as starch or dextrin. Sufficient H_2O to allow swelling is added, and after emulsification with yeast the prep. is incorporated with the other ingredients of the dough. C. Ranken.

Denatured spirits. Alcohol. Lactic acid.—See III. **Cattle fodder. Livestock feeds.**—See XIX.

XIX.—FOODS.

Most probable relationship between fat content, sq. gr., and total solids of milk. D. C. de Waal (Chem. Weekblad, 1931, 28, 691—694).—The formulæ in general use assume that the sp. gr. of the fat-free solids is const., which is not true. The relationship arrived at from determinations for 227 samples is: total solids = 0·2285 × (densimeter reading + [6 × fat content]). S. I. Levy.

Determination of starch in cereal products with special reference to rice. E. H. Hall (J.S.C.I., 1931, 50, 429—434 t).—It is suggested that the term " starch " be reserved to describe all matter included in and within the geometrical envelope of the starch grain irrespective of its chemical or physical constitution. A search is made for methods which will measure the starch content (defined as above) of rice. Results are given showing that the malt-diastase methods of O'Sullivan (J.C.S., 1884, 45, 1) (as slightly modified by the author), Brown and Millar (B., 1904, 137), and Tempus (B., 1923, 992 a) when applied to rice give figures which are in accordance with the starch determined by " difference " and with figures obtained in the commercial extraction of starch from rice, and therefore these methods satisfy the author's definition of starch. A possible source of error in O'Sullivan's method is pointed out, whilst Brown's method is examined in detail; the variation of Brown's factor with changes in p_H of the substrate are recorded, and certain recommendations are made. Brown's method slightly modified by the author is claimed to be a rapid and accurate method for the determination of " starch." Possible sources of error in the Rask method described by Herd and Kent-Jones (B., 1931, 694) are discussed.

Crystallisation of honey and behaviour of crystallised honey on heating. H. W. de Boer (Chem. Weekblad, 1931, 28, 682—686).—Crystallisation is most rapid at ±15°, and proceeds by development of new crystal nuclei as well as by growth of the original crystals. The max. formation of nuclei occurs at 5—7°. Honey which is required to remain liquid for 3—4 months should be heated at 60° for 4—6 hr. or at 65° for 2—4 hr. S. I. Levy.

Spray drying.—See I. **Calamary oil.**—See XII. **Fruit.**—See XVI.

See also A., Dec., 1421, α- and β-**Carotene.** 1443, **Influence of sunlight on milk.** 1451, **Buffer vals. of foods.** 1463—5, **Vitamins (various).**

Patents.

Testing milk for derangements in its composition. Dr. N. Gerber's Co. m.b.H. (B.P. 360,360, 29.7.30. Ger., 26.8.29).—Milk is tested for the presence of disease conditions and also to determine the end of the colostral period by means of an aq.-alcoholic solution containing a peroxide and an indicator (bromothymol-blue). E. B. Hughes.

Soluble casein. A. F. O. Germann (B.P. 360,018, 30.7.30).—Acid-pptd. casein (from milk) is dissolved by NH_3 and the solution spray-dried, thereby driving off both the H_2O and NH_3. E. B. Hughes.

Obtaining vegetable albumins. H. A. Beaufour (B.P. 361,346, 12.8.30).—Vegetable material is peptised by treatment with salt solution, and the filtered colloidal solution is incompletely dialysed through a membrane of medium porosity ($k = 300—1000$), under slight pressure in order to prevent endosmosis. The pptd. albumin is removed by centrifuging and the remainder recovered from the liquor by ultra-filtration. E. Lewkowitsch.

Preparation of chocolate and cocoa products containing vitamin. Comm. Venn. op Aandeelen onder de Firma C. J. Van Houten & Zoon (B.P. 360,282, 23.1.31. Addn. to B.P. 340,580; B., 1931, 415).—Vitamin-containing chocolate is prepared by replacement of all or part of the cocoa by a fat or wax containing irradiated ergosterol. High-melting fats or waxes are used to retard assimilation and to harden for use in the tropics, and soft fats for use in colder regions. E. B. Hughes.

Gelatin food preparations. Gen. Foods Corp. (B.P. 361,138, 3.12.30. U.S., 3.12.29).—The rate of setting of gelatin food products can be accelerated, and the rate of melting decreased, by the addition of neutral salts, phosphates, citrates, malates, etc. and mixtures of buffer salts. E. B. Hughes.

Extraction of vitamins. E. Langfeldt and R. Hellerud (B.P. 361,343, 19.7.30. Addn. to B.P. 334,950; B., 1930, 1097).—Solvent vapour is introduced into a solution or suspension of the material (*e.g.*, cod-liver oil, soap) so that it condenses in the form of fine droplets and passes through the mixture before separation; apparatus with suitable cooling devices is illustrated. E. Lewkowitsch.

Cattle fodder. R. Griessbach and O. Ambros, Assrs. to I. G. Farbenind. A.-G. (U.S.P. 1,806,290, 19.5.31. Appl., 4.1.28. Ger., 8.1.27).—Yeast is autolysed by agents such as EtOAc, and after neutralising the acids in the liquid mass by NH_3 the product is cautiously dried. C. Ranken.

Preparation of livestock feeds. C. R. Mabee, Assr. to C. H. Donaldson (U.S.P. [a] 1,807,043, [b] 1,807,067, 26.5.31. Appl., [a] 11.6.26, [b] 20.6.25).—Dry farm roughage such as straw, clover, etc. is moistened with an aq. admixture of $Ca(OH)_2$, $Mg(OH)_2$, NaCl, and S and is allowed to ferment. Malt, yeast, or other enzyme-containing substances are added if necessary, whilst substances such as PhCHO, for flavouring purposes, and $CaH_4(PO_4)_2$, for bone formation, may also be incorporated. C. Ranken.

Cacao.—See XII. **Panary fermentation.**—See XVIII. **Complex salts containing phenolic groups.**—See XX.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Determination of strychnine in plants. J. KRAUSS (Z. angew. Chem., 1931, 44, 946—947).—The alkaloid is pptd. from HNO_3 solution of definite composition as silicotungstate, and the residue after ignition weighed. S. I. LEVY.

Stability of preparations from organs. H. STEUDEL (Pharm. Ztg., 1931, 76, 1399—1400).—A systematic examination of the stability of commercial preps. of pancreas (3 samples), thyroid (4), ovary (6), and hypophysis (3) indicated that, generally, the activity corresponded to that stated by the makers and was retained over a period of one year. Only in some of the ovarian preps. had the activity decreased during this period; two were entirely inactive and only one retained its full activity. E. H. SHARPLES.

Commercial eucalyptus oils. A. R. PENFOLD (Tech. Mus., Sydney, Bull. No. 2 [revised edn.], 31 pp.).—The general properties and physical and chemical consts. of commercial oils from 14 species of eucalypts, and specifications for cineole and piperitone, are given together with methods for their examination.

E. H. SHARPLES.

Causes of irritation on injection of iodised ethyl esters of *Hydnocarpus*-group oils. H. I. COLE (Philippine J. Sci., 1931, 46, 377—382; cf. B., 1930, 121).—The conditions employed during iodination of these esters have an effect on the irritant properties of the products. A low (pan) type of container is preferable and occasional stirring is probably advisable. The iodised esters must be protected from action of air, especially in the presence of light or heat. There is no relationship between colour and irritant properties.

E. H. SHARPLES.

Hydrocarbon constituents of star-aniseed oil. K. J. DUNCAN, I. R. SHERWOOD, and W. F. SHORT (J.S.C.I., 1931, 50, 410 T).—Examination of residues obtained from a large quantity of star-aniseed oil resulted in the identification of the following hydrocarbons: α-pinene, *d*-Δ^3-carene, *d*-phellandrene, limonene, and dipentene. The sesquiterpene fractions consisted of dextrorotatory, dicyclic hydrocarbons (A) b.p. 128—131°/11·5 mm., n_D^{20} 1·5066, d_4^{20} 0·9206, α^{578} +6·46° (1 dm.); (B) b.p. 131—134°/11·5 mm., n_D^{20} 1·5031, d_4^{20} 0·9081, α^{578} +9·88° (1 dm.). Treatment of fraction A with 10% alcoholic H_2SO_4 yielded a product (n_D^{13} 1·5106, d_4^{13} 0·926) which furnished cadalene, but no eudalene, on dehydrogenation with S. Fraction B on treatment with HCl yielded an inactive dihydrochloride, m.p. 77—77·5°, crystallising in glistening flakes. The mother-liquor deposited a further quantity of this solid admixed with a small quantity of a hydrochloride crystallising in needles. Star-aniseed oil contains less than 0·2% of terpenes and about 0·28% of sesquiterpenes.

Medicinal glasses.—See VIII.

See also A., Dec., 1421, **α- and β-Carotene.** 1433, **Titration of quinine in ultra-violet light. *Strychnos* alkaloids.** 1438, **Colour reaction of adrenaline and adrenalone. Alkaloidal reagents.** 1439, **Silicotungstates and double mercuric iodides of the amine-oxides of alkaloids.** 1452, **Bromo-oleic acid.** 1460, **Tetanus toxin.** 1461, **Essential oils as germicides.** 1463—5, **Vitamins (various).**

PATENTS.

Treatment of spore-containing material [*e.g.*, catgut]. J. ZEISSLER (B.P. 360,796, 28.3.31. Ger., 4.4.30).—Spore-containing material, especially gut, is freed from bacillus spores by incubation, with or without the addition of acid-forming bacteria, in a culture substrate which contains a source of acid (*e.g.*, carbohydrates) in such quantity that the bacteria developed in the material to be de-spored give rise to an excess of acid. E. H. SHARPLES.

Production of pastilles which are soluble with difficulty for the treatment of wounds. F. ITTING (B.P. 361,233, 11.3.31).—Pulverised cellulose, of which the fibrous structure is retained, is mixed with a salt having a tervalent cation, *e.g.*, sulphate of Al, Fe, or Cr, with or without the addition of NaOAc or Na borate, and the viscous mass is formed into pastilles. E. H. SHARPLES.

Catalytic conversion of nopinene into pinene. A. CARPMAEL. From SCHERING-KAHLBAUM A.-G. (B.P. 356,020, 24.10.30).—Surface catalysts (porous tile, artificial zeolites, fuller's earth, bleaching earths) are stirred into nopinene at 115—150°. The catalysts are preferably boiled with water and/or acid and dried before use. C. HOLLINS.

Manufacture of basic products derived from cyclic acids [chaulmoogric and hydnocarpic acid derivatives]. I. G. FARBENIND. A.-G. (B.P. 357,250, 20.6.30. Addn. to B.P. 317,325 and 339,359; B., 1931, 334, 237).—An alicyclic carboxylic acid of the chaulmoogric or hydnocarpic acid type, or an ester, chloride, amide, or imino-ether derived therefrom, is condensed with a primary or *sec.* arylamine having a basic side-chain containing *tert.* N. *p*-Aminophenyl β-diethylaminoethyl ether is treated with hydnocarpyl chloride, b.p. 165—169°/8 mm., in abs. EtOH to give hydnocarp-*p*-β-diethylaminoethoxyanilide hydrochloride, m.p. 94—96°. The corresponding derivative from chaulmoogryl chloride, b.p. 170—175°/8 mm., has m.p. 87—90°.

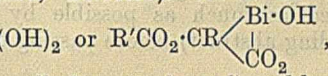
C. HOLLINS.

Manufacture of complex salts of organic compounds containing phenolic groups. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 356,192, 27.5.30).—Metal-amminium salts form complexes with org. compounds containing phenolic groups. The products have insecticidal and preservative properties. Examples are: 2 : 3 : 5-trichloro-*p*-cresol, 2 : 3 : 5-trichlorophenol, 2 : 4-dichloro- or -dinitro-phenol with $CuSO_4$ and NH_3; 2 : 3 : 5-trichloro-*p*-cresol or 2-chloro-4-nitrophenol with $Cu(OAc)_2$ and NH_3; 2 : 3 : 5-trichloro-*p*-cresol with $ZnCl_2$ and NH_3; *p*-nitrophenol with $Cu(CO_2H)_2$ and NH_3; 2 : 4-dichlorophenol with $Zn(OAc)_2$ and NH_3. The reaction occurs in MeOH. C. HOLLINS.

Manufacture of [2-]hydroxymethylbenziminazolearsinic acids. I. G. FARBENIND. A.-G. (B.P. 357,077, 28.4.31. Ger., 29.4.30).—An *o*-diaminobenzenearsinic acid is heated with aq. glycollic acid at 110—120°. The products from 3 : 4- and 2 : 3-diaminobenzene-1-arsinic acids melt at 210—215° and 250°, respectively, and are valuable against nagana and febris recurrens.

C. HOLLINS.

Preparation of fat-soluble salts of bismuth. Laboratoire français de Chimiothérapie, and A. Girard (B.P. 356,550, 24.10.30).—Basic Bi salts,



$$R{\cdot}CH(CO_2R'){\cdot}CO_2Bi(OH)_2 \text{ or } R'CO_2{\cdot}CR\Big<\begin{matrix}Bi{\cdot}OH\\ |\\ CO_2\end{matrix}\text{, are}$$

sol. in fat when R is an alkyl group above C_6 and has one or more branch chains, R′ being Me, Et, etc. Examples are Bi salts of Et H *sec.*-heptylmalonate and β-*sec.*-octylmalonate. The products are valuable against spirilosis and syphilis. C. Hollins.

Manufacture of bismuth compounds of benzenearsinic-stibinic acids. I. G. Farbenind. A.-G. (B.P. 357,061, 13.2.31. Ger., 15.3.20).—A benzenearsinic-stibinic acid, *e.g.*, 4-hydroxybenzene-1-arsinic-3-stibinic acid, its 5-acetamido-derivative, 3-hydroxybenzene-1-arsinic-4-stibinic acid, or benzene-1-arsinic-4-stibinic acid, as Na salt is stirred with $Bi(NO_3)_3$ or $BiCl_3$ and glycerin. After removal of $Bi(OH)_3$, EtOH ppts. from the nearly neutralised solution the complex salt; or the free acid may be separated by dialysis. The products are a more effective cure and prophylactic than the usual Bi compounds for syphilis in rabbits. C. Hollins.

Filter diaphragm.—See I. **Products of paraffin hydrocarbons.**—See II. **Arc electrodes.**—See XI. **[Theobromine from] cacao.**—See XII. **Dentures.**—See XIII. **Vitamins.**—See XIX.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Replenishing solution for a motion-picture positive-film developer. J. I. Crabtree and C. E. Ives (Sci. Publ. Kodak Res. Lab., 1930, **14**, 226—231).—A suitable formula for use with D-16 developer when developing by the rack-and-tank system is : H_2O (at 52°), Elon 0·3 g., Na_2SO_3 40 g., quinol 9 g., Na_2CO_3 38 g., citric acid 0·7 g., K metabisulphite 1·5 g., cold H_2O to make 1 litre. The solution is added in sufficient quantity to compensate for loss due to removal of developer by the film and racks. J. Lewkowitsch.

Method of testing for the presence of sodium thiosulphate in motion picture films. J. I. Crabtree and J. F. Ross (Sci. Publ. Kodak Res. Lab., 1930, **14**, 113—116).—The film is placed in a solution of 25 g. each of $HgCl_2$ and KBr per litre of H_2O. A turbidity indicates the presence of $Na_2S_2O_3$. The test is sensitive to 0·05 mg., and is quant., by comparison with standard solutions. Accelerated tests for fading may be made by suspending the film in moist CO_2 at 43°. Negative film is very resistant to fading even when it contains relatively much $Na_2S_2O_3$. J. Lewkowitsch.

Electrolytic oxidation of some photographic developers and corresponding derivatives. M. Abribat (Sci. Publ. Kodak Res. Lab., 1930, **14**, 63—68).—The depolarisation (*i.e.*, reduction in discharge potential) due to various developers in Na_2CO_3–H_2SO_4 and in Na_2CO_3–Na_2SO_3 solutions have been measured. *m*-Derivatives and benzoquinone show no depolarisation for the discharge of OH ions in the acid solution, but is relatively considerable in the sulphite solution. For each developer there is a limiting concn. beyond which depolarisation is not increased. No simple relation exists between the rate of oxidation of the developers and their reduction potential or reducing power in use. J. Lewkowitsch.

Second development of reversal images by sodium hydrosulphite. M. Abribat (Sci. Publ. Kodak Res. Lab., 1930, **14**, 258—263).—Characteristic curves of the reversal images show that the rate of development is greatest in the regions poorest in Ag salts. This abnormal behaviour is explicable only on the assumption that the reaction is catalysed by metallic Ag nuclei. J. Lewkowitsch.

Spontaneous growth of the latent image between exposure and development. I, II. E. R. Bullock (Sci. Publ. Kodak Res. Lab., 1930, **14**, 173—177).—The diminution in sensitivity caused by moisture may produce apparent positive results. Controlled experiments prove that the growth effect does exist and passes through a max. with increasing degree of development. The growth, defined as % increase in density (from $D =$ approx. 1) between 1 min. and 5 hr. delay in development, may be as much as 8%. J. Lewkowitsch.

See also A., Dec., 1353, **Photoluminescence of fluorescent dyes.** 1378, **Blackening of plates. Redox potential of vat dyes. Isolation of nuclei by developing agents. Photochemical studies. Density surface—the Villard effect. Solarisation. Photodichroism and photoanisotropy. Desensitisation.**

Patents.

Flash lights for photographic purposes. J. Ostermeier (B.P. 324,578, 28.3.29. Ger., 28.2.29).—Oxidisable material is ignited by an electrical device inside a transparent gastight vessel filled with O_2 or a gas capable of yielding O_2 and provided with a screen for absorbing a given part of the spectrum of the light emitted. The material is preferably in the form of a foil which may, if desired, be coated with an oxidising agent. A. R. Powell.

Flash lights for photographic purposes. J. Ostermeier (B.P. 357,239, 19.6.30. Ger., 22.6.29. Addn. to B.P. 324,578; preceding abstract).—The oxidisable material to be ignited is in the form of foil or powder applied on paper impregnated with oxidising substances (*e.g.*, Na_2O_2, MnO_2). J. Lewkowitsch.

Photography. N. V. Philip's Gloeilampenfabr. (B.P. 361,388, 14.7.30. Holl., 29.3.30).—A material sensitive to ultra-violet light or *X*-rays, but insensitive to visible light, is made by incorporating in a gelatin film such substances as Pb xanthate, $PbCl_2$, $HgNO_3$, $Pb(OAc)_2$, ZnS. Short exposure produces a latent image developable by, *e.g.*, $AgNO_3$ or $FeSO_4$, or long exposure may produce a direct image. J. Lewkowitsch.

[Projection of lenticular film copies in] colour photography. C. Nordmann (B.P. 362,490, 2.9.30. Fr., 2.9.29. Addn. to B.P. 360,524).

XXII.—EXPLOSIVES; MATCHES.

See A., Dec., 1374, **Speed of combustion of colloidal powder.**

Patent.

Manufacture of nitrocellulose smokeless powder. A. S. Hawkesworth (U.S.P. 1,809,695, 9.6.31. Appl., 13.6.30).—An improvement of the process described in

U.S.P. 1,713,505 (B., 1929, 798) consists in adding only about 6% of mononitrotoluene to coat the nitrocellulose, together with a volatile solvent for the nitrocellulose, and evaporating excess of solvent after granulating the powder. W. J. Wright.

XXIII.—SANITATION; WATER PURIFICATION.

Thermophilic digestion of daily charges of fresh [sewage] solids and activated sludge. H. Heukelekian (Sewage Works' J., 1931, **3**, 3—19).—50% of the volatile matter of ripe thermophilic sludge could be added in the form of fresh solids or activated sludge, nearly 90% of the daily charge being decomposed in 24 hr. Activated sludge was digested as readily as fresh solids, but the gas yield per g. of volatile matter added (decomposed) was 47% (33%) less.

Chemical Abstracts.

Digestion of [sewage] scum from preliminary settling tanks. C. E. Keefer and H. Kratz (Sewage Works' J., 1931, **3**, 50—53).—The scum was digested at 28° somewhat more rapidly than sludge, the digestion being 90% complete in 30 days at p_H 7·2—8·0.

Chemical Abstracts.

Germicidal efficiency of mixtures of phenols with sodium hydroxide, with glycerin, and with ethyl alcohol. F. W. Tilley and J. M. Schaffer (J. Agric. Res., 1931, **43**, 611—617; cf. B., 1931, 225).—Excess NaOH increased germicidal efficiency of PhOH and cresol against *Eberthella typhi* and *Staph. aureus*, but lowered that of thymol. Mixtures of PhOH and glycerol or EtOH had lower germicidal efficiency than the PhOH alone. W. G. Eggleton.

Complete removal of iron, manganese, and phenols from water by the A.D.M. process. Oefverberg (Gas- u. Wasserfach, 1931, **74**, 787—792).—The Adler "Diachlor-mutonite" process of H_2O purification at Ludwigshafen is described in detail. The H_2O is treated with 3 mg. of Cl_2 per litre, whereby the Fe is completely converted into and pptd. as $Fe(OH)_3$, the H_2S is converted into free S, and the Mn into hydrated MnO_2; all these impurities are completely retained by the Diachlor filter, the effluent from which passes to a contact filter filled with specially prepared MnO_2 which removes humins, the last traces of Mn, and bacteria. Excess Cl_2 is removed by means of the "mutonator" which is filled with active C (cf. following abstract). The Diachlor filters are cleaned once a month and yield a dark brown slime containing 80—85% MnO_2 and 20—15% $Fe(OH)_3$. (Cf. B.P. 292,099; B., 1928, 876.) A. R. Powell.

Use of active charcoal in the drinking water supply and in the treatment of waste water. F. Sierp (Gas- u. Wasserfach, 1931, **74**, 764—774).—The production, properties, and methods of testing and of regenerating activated charcoal filters used in H_2O purification are described and examples of the use of these filters in removing phenolic compounds from waste H_2O and excess Cl_2 from drinking H_2O which has been purified by the Cl_2 process are given. In the C pores the Cl is converted into HCl with the liberation of O from the H_2O; this nascent O reacts with org. material in the C and the HCl is neutralised by the carbonates in the H_2O. PhOH is adsorbed as such or as chlorophenol up to 1% of the wt. of the C; the filter is regenerated by steaming. To obviate the necessity for const. cleaning of the filters the H_2O should be purified as much as possible by other methods (cf. preceding abstract) before passing to the C filter. A. R. Powell.

Relative concentrations of negative ions in different parts of an electro-osmose apparatus [for water]. E. Bartow and F. W. Perisho (Ind. Eng. Chem., 1931, **23**, 1305—1309).—At all rates of flow below 30 litres per hr. an electro-osmose apparatus has been shown to remove completely Cl′, CO_3'', and SO_4'' ions. HCO_3' ions are less readily removed unless Cl′ or SO_4'' be also present. The efficiency of the apparatus under different conditions is discussed. J. W. Smith.

See also A., Dec., 1461, **Essential oils as germicides.**

Patents.

Killing or eliminating flies and preparations therefor. I. G. Farbenind. A.-G. (B.P. 360,638, 22.10.30. Ger., 28.10.29).—A substance, $ArCO_2X$ (X = aryl, alkyl, or aralkyl, Ar = Ph or substituted Ph), mixed with a high-boiling (200—260°) petroleum hydrocarbon is used as a spray. E. H. Sharples.

Manufacture of a filter, particularly a respiratory filter, for smoke and gas. G. K. E. H. Stampe (B.P. 362,064, 25.9.30).—Increased efficiency over other filters of equal air friction is claimed for pads made from natural or artificial fibres separated by means of a rotating wire-brush and packed into permeable containers by an air current. If necessary, a little mechanical pressure can be applied, but binding material is excluded. C. Jepson.

Softening of [boiler] water. Chem. Fabr. Budenheim A.-G. (B.P. 361,810, 2.5.31. Ger., 29.7.30).—A mixture of fresh feed-water with alkaline boiler water or boiler sludge water flows down a central cavity in a vertical filtering tank so that part of the hardness of the feed water is pptd. by the alkali. The water then flows up the surrounding annular space, which is provided with filters at the bottom and top and with an inlet, just above the lower filter for supplying sufficient Na_3PO_4 to remove residual hardness. L. A. Coles.

Purification of water with lime. S. A. Krüger (B.P. 361,081, 24.10.30. Denm., 5.9.30).—Any excess of $Ca(OH)_2$ in the softened water may be removed by treating with substances insol. in H_2O, but able to form insol. compounds with $Ca(OH)_2$, *e.g.*, hydrous silicic acid. C. Jepson.

Systems for purifying [de-mineralising] water by electrolysis. F. C. H. Pain, and Etabl. Phillips & Pain (B.P. 362,328, 29.5.31. Fr., 5.6.30).—Electrolytic diaphragms divide the cell into five chambers; H_2O enters the central chamber, and in each of the outer chambers an electrode of opposite polarity from that of the electrode in each of the adjacent washing chambers is arranged. J. S. G. Thomas.

Reduction of scale deposits. Filter diaphragm.—See I. **Bacterial isolation of cellulose.**—See V. **Base-exchange zeolite.**—See VII. **Insecticide.**—See XVI.