BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JULY 7 and 14, 1933.*

I.—GENERAL; PLANT; MACHINERY.

Measurement of thermal conductivity of poor and medium heat-conducting materials. R. W. B. Stephens (Phil. Mag., 1933, [vii], **15**, 857—880).—The rate of rise or fall of temp. of a liquid in a cylindrical tube of the material to be examined, when placed in a liquid bath at a different temp., is measured. H. J. E.

Determination of void content of close-packed mineral powders. Effect of particle size, shape, and texture. R. N. Traxler, L. A. H. Baum, and C. U. Pittman (Ind. Eng. Chem. [Anal.], 1933, **5**, 165—168).—The void contents of commercial mineral powders and of some specimens fractionated according to particle size have been determined by (1) dry compaction, (2) liquid absorption, (3) briquetting. In most cases the lowest vals. for void content were obtained by the briquetting method. Particle size appears to have no appreciable influence on the void content in limestone, marble, SiO_2, or black slate, although contradictory results were found with trap rock and soapstone. The void content is influenced by texture, but regularity of particle size is probably more important. E. S. H.

Effect of particle size on [water-softening] capacity of zeolites. P. Bird, F. Colburn, and F. Smith (Ind. Eng. Chem., 1933, **25**, 564).—The H_2O-softening action of zeolites is a function of the available surface or of particle size. Four samples of artificial zeolites were screened and the capacity (g. of $CaCO_3$ equiv. removed from H_2O, before exhaustion, per litre of zeolite) was determined for different particle sizes. In each case it decreased linearly with increasing coarseness, the slopes of the curves varying somewhat. C. I.

Theoretical principles relating to continuous distillation columns. J. Pérard (Bull. Assoc. Chim. Sucr., 1933, **50**, 62—75).—Formulæ are derived expressing the thermal relations for the separation of the constituents of a binary liquid mixture fed to the middle of a single-column plate still. In practice, conditions differ widely in some respects from the ideal assumptions made, and some corrections are suggested to render the formulæ more valid. J. H. L.

New viscosimeter [for lubricating oil etc.]. J. Kadlec (Z. Zuckerind. Czechoslov., 1933, **57**, 307—308).—A calibrated tube, capable of being closed top and bottom and surrounded with a glycerin bath, is filled with the substance under examination so as to leave a space of about 1·5 cm. at the top. After adjusting the temp., the tube is inverted and 2-min. readings are made of the height of the bubble and the temp. Data for the plotting of a curve characteristic of each type of oil are thus obtained. J. P. O.

Theory of absorption towers. II. Absorption of nitrogen peroxide in sodium carbonate solution. W. Hennel (Chim. et Ind., 1933, **29**, 1042—1044; cf. B., 1933, 495).—Badger and McCabe's general equation, if it is assumed that the concn. of NO_2 in the gas at the point of contact is negligible, becomes $\log Y_O/Y_H = KaV/G$, where Y_O, Y_H are the concns. at the bottom and top of the tower, G is the vol. of gas passed per hr., a the packing surface per cu. m. of space, and V the vol. The const., K, was determined for a small experimental tower, the above quantities being varied and consistent results obtained. In this case K is the sum of $NO_2 + NO$ absorbed by unit surface in unit time for unit gas concn. The separate consts. can be obtained by determining $NaNO_2$ and $NaNO_3$ in the liquid. C. I.

Patents.

Furnace. L. de Florez, Assr. to Texas Co. (U.S.P. 1,862,737, 14.6.32. Appl., 3.11.28. Cf. U.S.P. 1,717,334; B., 1929, 799).—A furnace of cheaper construction and adapted for burning gas, oil, or powdered fuel is described. The "convection" member may be an economiser or air preheater. D. K. M.

Retort. I. H. Derby, Assr. to P. C. Reilly (U.S.P. 1,870,901, 9.8.32. Appl., 6.3.29).—A retort (*A*) rotatable in a furnace is described. It has removable ends which are attached to shafts and form the sole support for *A* when in use, and the shafts are hollow to enable fluids to be added or withdrawn. B. M. V.

Heat-treatment of articles. Electrical Research Products, Inc., Assees. of H. Blount and H. Sheel (B.P. 391,442, 26.10.31. U.S., 12.11.30).—The articles, *e.g.*, Cu coils to be annealed in absence of air, are conveyed on an elevator in succession through: *A*, a H_2O-seal; *B*, a heating chamber; *C*, a soaking chamber above *B* and heated only by convection therefrom, controlled by a baffle; *D*, a steam seal at the top; *E*, a cooling chamber on the downward run; *F*, unloading and loading point above *A*. It is intended that the goods be thoroughly wetted in *A*. B. M. V.

Heating tube [for bakers' ovens]. R. Thurm (U.S.P. 1,872,363, 16.8.32. Appl., 28.10.29).—Tubes as used in the Perkins steam oven are charged with alloys of more than one alkali metal, *e.g.*, K 50—75, Na 50—25%. A vapour space is left, but no air is present. B. M. V.

Heat insulator. J. B. Barnitt and R. B. Derr, Assrs. to Aluminum Co. of America (U.S.P. 1,870,437, 9.8.32. Appl., 27.6.27).—Al_2O_3,H_2O is artificially produced in finely-divided form from $Al(OH)_3$ or higher

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

hydrate by heating to 126—206° in presence of a little NaOH. Bricks, sheets, etc. made therefrom may be bonded with an aluminate, and asbestos and sawdust may be added. B. M. V.

Spray dryer. W. F. Richards, Assr. to S. M. A. Corp. (U.S.P. 1,871,737, 16.8.32. Appl., 7.12.28).—From a central bottom inlet the preheated gases circulate up the centre and down the sides of a drying chamber, leaving under a skirt in an inner wall into an annular chamber above which are bag-filters. The material is supplied by sprays in the upper part and is raked in the dry form off the floor. B. M. V.

Drying of material. L. B. West and M. P. Wall, Assrs. to Simplicity System Co. (U.S.P. 1,871,934, 16.8.32. Appl., 16.3.31).—A double-concentric drum dryer is operated so that the material during the first longitudinal flow is in contact with the hot gases, and on the return with cooling gases. Two products are discharged, viz., air-borne fine material and the coarse by gravity. B. M. V.

Circulation dryer without crushing means. P. Rosin (B.P. 391,388, 21.11.32. Ger., 24.11.31).—In a dryer of the type in which partly dried particles are separated by gravity from the drying-conveying gas stream, a difference of pressure is created between the point of separation and the earlier point to which the half-dry particles are returned by means of an injector or mechanical fan-like device, which may also serve as a feeder for the original material. B. M. V.

Regenerative heating of reaction chambers for carrying out endothermic chemical reactions. Ruhrchemie A.-G. (B.P. 391,817, 28.9.31. Ger., 27.9.30). —Four regenerators are arranged at the points of a cross and are connected to each other by tubes extending across the centre of the cross each way in alternate layers. The tubes are formed in a solid mass of metal, forming a recuperator, and if any refractory lining is necessary to prevent corrosion it is thin. B. M. V.

Carrying out chemical reactions in the liquid phase. F. E. Smith, and Imperial Chem. Industries, Ltd. (B.P. 391,800, 3.11.31).—A vertical vessel is divided by horizontal partitions having central apertures and is also provided on the axis with cylindrical guides between, but not touching, the partitions. The reagents are injected upwards through the bottom, producing local circulation in each compartment and slower transfer from stage to stage. One of the reagents is preferably a gas or vapour, and different temp. may be maintained in the different stages. The apparatus is applicable to hydrogenation of carbonaceous materials, under pressure. B. M. V.

Catalytic process and apparatus [for vapour-phase organic catalysis]. (a) A. O. Jaeger and (b) J. A. Bertsch, (a) Assr. to Selden Co. (U.S.P. 1,872,956, 23.8.32. Appl., 6.2.26).—Catalytic activity of metallic walls of vessels is prevented by coating them with alkali-metal compounds containing catalytically active radicals ; *e.g.*, $KHSO_4$ and KH_2PO_4 are effective in preventing total combustion of EtOH or benzol in air. B. M. V.

Hammer crusher. G. W. Borton, Assr. to Pennsylvania Crusher Co. (U.S.P. 1,872,233, 16.8.32. Appl., 21.3.30).—The main breaker plate is pivoted and a portion of it is pivoted on the main part, both being adjustable. B. M. V.

Jaw crushers. Nordberg Manufg. Co. (B.P. 391,622, 27.5.32. U.S., 15.6.31).—A jaw crusher of the type that is run at a speed high enough for the largest crushed piece to be the same size as the min. opening of the jaws has both jaws inclined the same way, the fixed one being uppermost. The swing jaw is directly driven by an eccentric and is supported by compression links pivoted on the frame in such a position that the jaw reciprocates and rolls rather than swings ; the side cheeks are on this jaw. B. M. V.

Crushing and mixing mills of the edge-runner type. Winget, Ltd., and H. Martinez (B.P. 391,294, 9.3.32).—A discharge plough which rotates with the edge-runner assembly is operated by a hand lever that does not rotate. B. M. V.

Grinding mills. A. E. G. MacCallum (B.P. 391,231, 27.10.31).—A grinding roll is provided with a hopper divided into compartments, grinding bars being situated at the dividing walls ; all compartments are provided with stirrers, and the final scraper is adjusted to remove less material than the intermediate bars allow to pass, so that there is a return flow from compartment to compartment over adjustable weirs in the upper part of the walls. B. M. V.

Grinder. F. Lang, Assr. to W. A. Riddell Co. (U.S.P. 1,872,469, 16.8.32. Appl., 27.12.29).—An edge-runner mill with overdriven revolving pan is described. B. M. V.

Apparatus for screening and washing granular material. Parker, Winder & Achurch, Ltd., and W. H. Smith (B.P. 391,269, 23.1.32).—An inclined, cylindrical, rotary screen is formed with the feed section having the smallest apertures of larger diam. than the rest and dipping into a bath of H_2O from which the screened sand is lifted by mechanical rakes. The coarser material is lifted to the remaining portion of the screen by internal curved vanes, perforated so that they do not lift much H_2O. B. M. V.

Centrifuge. L. F. Clark (U.S.P. 1,873,185, 23.8.32. Appl., 10.12.30).—A centrifuge for separation of solids from liquids is continuously operated with Hg or other heavy liquid in the bowl, over the surface of which the floating solids are raked out by a helical inner member rotating at a higher speed than the bowl. B. M. V.

(a) **Centrifugal machine.** (b) **Separation of [liquid] substances.** L. D. Jones, Assr. to Sharples Specialty Co. (U.S.P. 1,872,962—3, 23.8.32. Appl., [a, b] 13.4.25. Renewed [b] 17.2.32).—(a) A small bowl, *e.g.*, for automobile lubricating oil, is allowed to assume only a limited inclination to its driving means, and resilient straightening means are provided. (b) Oil, *e.g.*, transformer oil, is centrifugally purified while at elevated temp., to reduce its viscosity, and then passed without lowering of temp. in cascades through a vac. chamber. B. M. V.

Filter-press. L. B. Smith and E. H. ten Broeck, Assrs. to Atlantic Refining Co. (U.S.P. 1,863,071, 14.6.32. Appl., 15.11.29).—A plate-and-frame press with central feed is provided with a no. (preferably 4) of feed passages to distribute the pulp more evenly. The frame at the inlet end is made thicker than the rest to form a distributing chamber from the single inlet to the four passages. B. M. V.

Filter construction. W. E. Wood and W. H. Bagheldor, Assrs. to Standard Oil Co. (U.S.P. 1,871,870, 16.8.32. Appl., 26.7.29).—In a pressure filter, baffle plates are provided over the mouths of the inlet conduits to prevent disturbance of already formed cake. B. M. V.

Filter-presses, and more particularly a combined filter- and hydraulic press. A. L. Mond. From I. G. Farbenind. A.-G. (B.P. 391,559, 29.1.32). A press has twin opposed hydraulic rams the circular faces of which and of one or more intermediate spacers are provided with filter medium. The ram cylinders are loose but well-fitting sleeves, and the prefilt is supplied axially through the ram before the hydraulic pressure is applied. B. M. V.

Filters. Oliver United Filters, Inc., Assees of G. O. Hillier (B.P. 391,258, 7.1.32. U.S., 7.1.31).—In a continuous drum filter, the cake is removed by a stationary suction device outside the drum, the interior of the cell at that point being merely opened to atm. by the usual filter valve. The small amount of filtrate trapped in the cell is caught by the rush of air, and the spray serves as a back-wash for the cloth. B. M. V.

Multiplex rotary-drum filter. F. W. Becraft, Assr. to Dorr Co., Inc. (U.S.P. 1,870,485, 9.8.32. Appl., 17.10.30).—A Dorr filter is constructed with several co-axial drums having separate feed pipes and sets of outlet pipes, but the latter lead to a common valve and the cake-discharging conveyor is common to all drums. For easy arrangement of the filtrate pipes the drums successively decrease in diam. away from the open end. B. M. V.

Filtering process and apparatus. W. G. Whitman, Assr. to Standard Oil Co. (Indiana) (U.S.P. 1,871,207, 9.8.32. Appl., 20.10.30).—In the filtering of hot, oily matter, *e.g.*, high-pressure tar, after the cake is built up the prefilt is forced out and the cake washed by steam to which a spray of H_2O is added in amount sufficient only to be completely converted into steam in the cake. B. M. V.

Filtration. W. E. Kinnison, Assr. to Standard Oil Co. of Indiana (U.S.P. 1,871,891, 16.8.32. Appl., 17.4.30).—In the filtration of, *e.g.*, wax from oils, after melting out the cake with steam the condensed H_2O that has taken its place is removed by causing the filter cloths to meet by the application of a vac. B. M. V.

Filtration plant control. S. L. Adelson, Assr. to Gen. Zeolite Co. (U.S.P. 1,870,321, 9.8.32. Appl., 17.11.27).—Electro-hydraulic controls are described for maintaining const. the flow through filter beds, or, when choked, to wash them. B. M. V.

Filter for liquids. A. Kretzschmar (U.S.P. 1,871,122, 9.8.32. Appl., 30.11.31. Ger., 27.12.28).—A device for back-flushing a sand filter with air and H_2O is described. B. M. V.

Application of liquid to filter cakes. F. B. Coley, Assr. to Dorr Co., Inc. (U.S.P. 1,870,442, 9.8.32. Appl., 10.9.29).—Wash-H_2O is applied to the cake on a rotary filter by means of devices like scent sprays, the impact being too gentle to disturb the cake. B. M. V.

Classifiers. Dorr Co., Inc. (B.P. 391,240, 18.11.31. U.S., 18.11.30).—In a bowl classifier, the rakes are of progressive depths so that their upper edges are in a single plane below the surface of the liquid, and are fastened to short lengths of I-beam of which the flanges are below and above the liquid ; the web is tangential to the circle of rotation, thus producing a very slight agitation of the surface, the radial driving arms being completely above H_2O-level. A feed well is described giving radial flow to the pulp starting some distance from the centre. B. M. V.

Decantation apparatus. H. S. Coe (U.S.P. 1,870,441, 9.8.32. Appl., 17.2.28).—Solids are lifted out of a pulp by means of a sloping annular table over which U-shaped scoops slide to discharge the material. Agitating blades may also be attached to the lifting wheel. B. M. V.

Treatment of water. R. H. S. Abbott (B.P. 391,865, 7.11.31).—When Hg is agitated in a glass vessel in the presence, under reduced pressure ($\ngtr$ 40 mm. Hg), of a gas, *e.g.*, Ne, which has no deleterious chemical effect thereon an electrical discharge is produced which, when applied to H_2O, alters the crystal structure of hardness-forming salts and produces in the boiler a soft slime instead of a hard adherent scale. C. J.

Treatment of water. R. B. Derr, Assr. to Aluminum Co. of America (U.S.P. 1,870,404, 9.8.32. Appl., 9.11.29).—Sol. phosphates and aluminates are added to cause flocculation ; *e.g.*, addition of $Na_2Al_2O_4$ and Na_3PO_4 in proportions between 4 : 1 and 1 : 4 is suitable. B. M. V.

Selective separation of liquids. A. Johnson, Assr. to Combustion Utilities Corp. (U.S.P. 1,872,958, 23.8.32. Appl., 12.12.24).—An emulsified mixture of liquids is separated (*e.g.*, tar is dehydrated) by spraying into a gas (coal gas still retaining heat from the retorts) which is superheated with respect to the vapour of the more volatile liquid. At the base of the tower the moist gas at a temp. above the dew point is removed separately from the tar. B. M. V.

Separation of [liquid] mixtures of substances only partly miscible. W. K. Lewis, Assr. to Standard Oil Development Co. (U.S.P. 1,870,854, 9.8.32. Appl., 25.4.29).—An aq. solution rich in org. liquids such as the higher alcohols is rectified in the presence of a suitable solvent, *e.g.*, oil of low b.p., producing a residue of anhyd. alcohol and a distillate which separates into two layers. The lighter (alcoholic) layer is then returned as reflux and the heavier (aq.) layer extracted with more solvent, H_2O being rejected and alcoholic oil returned to the rectifier. B. M. V.

Apparatus for heat-treating liquids. E. C. D'Yarmett, Assr. to Fractionator Co. (U.S.P. 1,870,445, 9.8.32. Appl., 28.2.30).—Oil, *e.g.*, is distilled in a tapered vertical vessel surrounded by a heating medium and provided with vanes rotated in close adjustable proximity to the wall of the vessel to produce rapid motion of the oil against the heat-transmitting surface. B. M. V.

Constant-pressure and -temperature distillation. D. G. Brandt, Assr. to Doherty Research Co. (U.S.P. 1,872,879, 23.8.32. Appl., 30.7.23).—The upper part of a dephlegmator for, *e.g.*, cracked petrol is provided with a surface cooler and above that direct cooling in the form of a spray of petrol, in amount small enough to be completely volatilised, which may be derived from the final condenser. The temp. and pressure of the leaving petrol vapours are caused to regulate the amount of cooling liquid supplied to the indirect cooler. B. M. V.

Means permitting of evaporating or of degasifying *in vacuo* continuously a liquid contained in any vessel or apparatus. Manuf. de Machines Auxiliaires pour l'Electricité et l'Industrie, and D. A. L. Texier (B.P. 392,044, 15.9.32).—The liquid is delivered into the vac. chamber over a no. of perforated plates surrounding a heater and covered by a hood. An air-cooled condenser is placed in the conduit leading to the dry vac. pump and a preheater in that leading to the wet pump; the last-named is provided with a re-priming injector. B. M. V.

Bubbler cap construction. W. G. Laird, Assr. to Heat Treating Co. (U.S.P. 1,873,137, 23.8.32. Appl., 5.3.30).—A construction of riser and cap which is easily assembled is described. B. M. V.

Fractionating system. D. A. Monro, Assr. to Standard Oil Co. (U.S.P. 1,871,819, 16.8.32. Appl., 25.4.31).—A form of bubbling plate is described, having an axial man-passage used as an upflow. B. M. V.

Method of extraction or other countercurrent treatment. J. M. Coahran (U.S.P. 1,870,834, 9.8.32. Appl., 16.3.27).—An apparatus, as described in U.S.P. 1,845,128 (B., 1932, 1061), is applied to the extraction of AcOH. B. M. V.

Measuring [simultaneously] the viscosities of [a series of] liquids. H. T. Kennedy (U.S.P. 1,870,412, 9.8.32. Appl., 15.3.27).—A no. of vertical burettes are placed in a bath of a liquid that boils at the temp. of measurement, the burettes being provided with equalised outlets which are opened and closed simultaneously. One of the burettes is filled with liquid of known viscosity, and all are discharged together until the standard liquid reaches its viscosity no. on its own burette. The meniscus readings on the other burettes are then noted. B. M. V.

Absorber systems. Silica Gel Corp., Assees. of E. B. Miller (B.P. 391,221, 22.10.31. U.S., 18.11.30).—In an absorber provided with internal heat exchanger for reactivation by heating and cooling, the cooling liquid circulates by thermosiphon between the absorber and a cooler of large storage capacity and is blown out to the latter by the heating steam. B. M. V.

Apparatus for removing solid matter from air and gases. W. Zellweger (U.S.P. 1,871,022, 9.8.32. Appl., 18.8.30).—A rotating filter-ring produces centrifugally a higher pressure at the outlet than at the inlet, thus preventing cakage of dirty gas. Large particles are removed by an inertia device and dropped into a reservoir of scrubbing liquid with which the rotating parts are sprayed. B. M. V.

Container for inflammable liquids. A. Weingessel (B.P. 391,700, 21.10.32. Czecho-Slov., 11.2.32).

H_2O-softening product.—See VII. **Alloy for pistons.**—See X. **Cleaning and purifying gases.**—See XI. **Milk evaporator.**—See XIX.

II.—FUEL; GAS; TAR; MINERAL OILS.

Development of Dakota lignite. X. Effect of inorganic materials on reactivity of low-temperature lignite char. A. W. Koth and I. Lavine (Ind. Eng. Chem., 1933, **25**, 570—574; cf. B., 1933, 372).—The reactivity of low-temp. lignite chars made from mixtures of lignite and inorg. materials was studied by passing purified O_2 at 2·4 litres/hr. over the char heated in a furnace the temp. of which was raised at 2·5°/min. The "relative reactivity temp.," at which the char temp. overtakes the furnace temp., and the temp. at which CO_2 is first liberated, are noted. Na_2CO_3 and $CaCO_3$ increase reactivity; for Na_2CO_3, this is attributed to reaction between C particles and Na_2CO_3. $FeCl_3,6H_2O$, $MgCl_2,6H_2O$, $AlCl_3,6H_2O$, and $Al_2(SO_4)_3,18H_2O$ decrease reactivity. Reactivity is reduced by extraction of lignite with HCl before carbonising, and to a less extent by extraction with NaOH. Hence, ash has more effect on reactivity than humates have. The rate of evolution of CO_2 during a reactivity determination was higher for the more reactive chars. Reactivity decreased with decreasing particle size. T. H. B.

Evaluation of gas coals. P. Schläpfer (Monats-Bull. Schweiz. Ver. Gas- u. Wasserfachmännern, 1932, No. 6, 18 pp.).—The importance of the ash content of a gas coal is emphasised, and attention is drawn to the relationship between the volatile matter and ash in the coal to the ash in the coke. Whilst the proximate analysis is valuable for purposes of control, other tests are often necessary, particularly with new coals or coal blends; these tests include determinations of caking power, swelling and swelling pressure. For the production of coke of uniform quality it is desirable that the banded constituents should be well distributed. A more complete examination would also include a distillation test, determination of the calorific val., and the ultimate analysis. The swelling properties of a coal are greatly reduced by preheating. Though the presence of O_2 hastens this change, it occurs also if the coal is heated in an inert gas or *in vacuo*. Similarly, the swelling properties are influenced by the rate of carbonisation. W. H. B.

Rapid volumetric determination of sulphur in coal and coke. Comparison of a modified benzidine method with the standard methods. E. L. Skau and I. L. Newell (Ind. Eng. Chem. [Anal.], 1933, **5**, 180—182).—After combustion, the contents of the bomb calorimeter are washed out with saturated aq. benzidine sulphate and a saturated solution of benzidine hydrochloride is added with const. stirring. The ppt. is filtered, washed free from acid, suspended in H_2O, and titrated (to phenolphthalein) with NaOH solution.

Results for 15 coals and cokes compare favourably with those obtained by other methods. E. S. H.

Chlorine determination in coal. W. A. Selvig and F. H. Gibson (Ind. Eng. Chem. [Anal.], 1933, **5**, 189—191).—Extraction of pulverised coal with H_2O may give very low results for Cl. The coal is ignited in an O_2 bomb calorimeter and Cl′ is determined by titrating the bomb washings with $AgNO_3$. The Cl content of different coals examined varies between about 0·5 and 0·01%. E. S. H.

Briquetting of New Zealand coals. W. A. Joiner, W. G. Hughson, and A. K. R. McDowell (N.Z. Dept. Sci. Ind. Res., Bull., 1933, No. 39, 32 pp.).—Briquetting experiments on such coals, using coal-tar pitch and bitumen as binders, in a small ovoid briquetting plant show that with 7·5—8% of the binder briquettes were produced which were strong enough to withstand handling and transport. Burning tests in domestic grates were very satisfactory, particularly with those made from non-swelling coals or blends of these with strongly coking coals. Firing tests on locomotives demonstrated the suitability of bituminous coal briquettes for railway use, with the exception of "brown" coal blends, where sparking trouble was experienced. Approx. erection and running costs of a briquetting plant are given. C. E. M.

The coking process. P. Schläpfer and A. R. Morcom (Eidgen. Materialprüfungsanst. E.T.H. Zürich, 1933, Ber. No. 62, 60 pp.).—Coal was separated by an extraction method similar to that used by Wheeler (cf. B., 1927, 401) into α, β, γ_1, γ_2, and γ_3 constituents and the physical and chemical properties of the fractions were investigated. The α extracts, and to a lesser extent the β, were rapidly oxidised in air. Mixtures of the α substances with the various extracts in different proportions were subjected to coking tests in a crucible and the crushing strengths of the resulting coke buttons were determined. The γ_2 and γ_3 extracts of the four coals studied each produced strongly caking mixtures, but the γ_1 extract was almost without caking action. The β extracts from different coals behaved differently. The swelling properties of the mixture and the strength of the coke were influenced by the particular α extract from which the mixture was prepared. The strength of the coke was much reduced if the α extract used had been previously exposed to air for a long time or preheated. If the extracts were mixed together in their natural proportions, the mixture yielded a much weaker coke than the original coal; moreover, the coke showed no trace of swelling. This phenomenon was considered to be connected with an alteration in the colloidal state of the coal substance during extraction. W. H. B.

Tests in Germany on the distillation of coals by the Vertù process. L. Vertù (L'Ind. Chimica, 1933, **8**, 446—450; cf. B., 1932, 711).—Good results were obtained by Otto und Co., Bochum, on application of Vertù's process to anthracite, coking coal, and mazout, all of German origin. T. H. P.

Production of town's gas from brown coal. R. Heinze (Gas- u. Wasserfach, 1933, **76**, 262—267, 283—285, 300—305).—Progress since 1927 is reviewed. Carbonisation of brown-coal briquettes can be carried out at a lower temp. than with bituminous coal. The tar is more amenable to cracking, but the gas contains more CO_2 and CO, less $C_{10}H_8$ and NH_3, more benzol, and, in general, from 0·1 to 1·0 vol.-% H_2S. The coke (40% yield) contains about 10% of ash, and as it has a high reactivity it is a good water-gas fuel. Carbonisation in Koppers' vertical-chamber ovens fitted with cracking chambers gave a gas (5% CO_2 basis) of average composition CO_2 5·0, C_nH_m 3·0, O_2 0·4, CO 25·3, H_2 48·5, CH_4 14·5, N_2 3·3%, and having *d* 0·521 and calorific val. 4285 g.-cal./cu. m.; 20·5—34·4 c.c. of benzol were recovered per cu. m. Gasification of the fine coke in a step-grate producer is described; the gas formed contained CO_2 5·0, CO 26·5, H_2 10·0, CH_4 0·5, and N_2 57·9%, with a calorific val. of 1163 g.-cal./cu. m. It is necessary to remove the greater part of the CO_2 by a Na_2CO_3 wash before distribution (approx. cost 0·035d./cu. m.). The ratio of the cost of gas from brown and bituminous coals is estimated to be 1 : 1·06. R. N. B.

Influence of the tar content of brown-coal briquettes on the yield of town's gas obtainable therefrom by high-temperature carbonisation. E. Dell (Gas- u. Wasserfach, 1933, **76**, 325—327).—On the basis of the results of analyses and low-temp. carbonisation assays (Fischer), combined with the results of previous investigations of the gas yields obtained by cracking the low-temp. tar, and by gasifying the coke at higher temp., the yields of town's gas (calorific val. 4200 kg.-cal./cu. m.) from 3 samples of brown-coal briquettes, of tar contents 14·62, 10·4, and 7·4%, have been estimated to be 780, 610, and 490 cu. m./ton, respectively. A. B. M.

Coal–water-gas producers on coke-oven plants. Pistorius (Brennstoff-Chem., 1933, **14**, 169—170).—The increased demand for gas from coke-oven plants is most conveniently met by providing a coal–water-gas producer to cover the peak loads. A producer suitable for this purpose is described. It can utilise any gas coal, being provided with an efficient mechanical stirring device which prevents agglomeration of the more strongly caking varieties. It has a large throughput and is reliable in operation. The blast gases are withdrawn at the top of the gasification zone both at the circumference and through a central offtake. The water-gas formed on steaming this zone is passed up through the carbonisation zone, the mixed water-gas and coal gas being passed to storage. The cost of gas production in a 50,000-cu. m. per day plant, neglecting interest on capital, is estimated at 1·47 pf. per cu. m. A. B. M.

Calculation of the ignition limits [of explosive gas mixtures] from rate of propagation of the flame. K. Bunte and G. Jahn (Gas- u. Wasserfach, 1933, **76**, 89—95).—Mathematical. A graphical method is described by means of which it is possible to extrapolate the ignition limits of mixtures of air and combustible gases from measurements of the rate of propagation of the flame. The results obtained differ in some cases considerably from those determined by the static method. For H_2 and CO the min. composition of the atm. for ignition to occur is 93% N_2 + 7% O_2 or 88% CO_2 + 12% O_2 and for CH_4 86% N_2 + 14% O_2 or 81% CO_2 + 19% CO_2. To prevent ignition in air 77% N_2 must be added to H_2, CO, or CH_4, and to prevent ignition in a 79 : 21 CO_2–O_2 mixture about 46·5% CO_2 must be added to the combustible gas. A. R. P.

Action of alkali halides on the auto-ignition temperature of carbon monoxide-air mixtures. Prettre (Mém. Poudres, 1932—33, **25**, 160—168).—Even 0·4% of an alkali chloride considerably raised the ignition temp. of the gas mixture when vaporised into the heated gas stream; with 3·5% of KCl, and a mixture containing 24·8% of CO, the temp. was raised from 656° to 1010°. Addition of 10 mg. per litre is sufficient to prevent auto-ignition. When ignition has been prevented by the use of the exact amount of alkali chloride necessary to do so, the gas mixture undergoes a slow, luminous oxidation, and to suppress this about 2—3 times the amount of chloride is required. Small amounts of H_2O vapour lower the ignition temp., and mixtures of CO–air with H_2 also ignite at a lower temp. than does CO–air alone. The effect of alkali chlorides explains their muzzle-flash suppressing action. The mechanism is not yet explained. W. J. W.

Auto-ignition temperatures of hydrogen–air mixtures in presence of alkali halides. Prettre (Mém. Poudres, 1932—33, **25**, 169—175).—Additions of 2 to 18·20 mg. KCl per litre of H_2–air mixtures containing 28·75, 37·7, 48·25, and 54·95% H_2, respectively, failed to reduce the ignition temp. (606—631°). This emphasises the difference in the mechanism of auto-ignition of air–H_2 and of air–CO mixtures (cf. preceding abstract) and the necessity for research to determine at what concn. of H_2 air–CO mixtures containing H_2 will behave like air–H_2 mixtures in presence of flash-reducing agents. W. J. W.

Asphalts and allied products. H. Rabaté (Chim. et Ind., 1933, **29**, 766—780, 1026—1041).—The mode of occurrence, classification, physico-chemical properties, and methods of testing of asphalts, bitumens, and pitches are comprehensively summarised. A. B. M.

Analysis of bituminous schists. J. Barlot (Compt. rend., 1933, **196**, 1116—1117).—The schist is treated successively at $\not>$ 50° with 50% aq. HCl and 50% aq. HF containing 1% H_2SO_4. C, H, N, O, and S in the residue, which contains only 4—5% of mineral matter, are then determined. 90% of the S is present as pyrites. A sample gave C 8·03, H 1·70, N 1·54, S 1·32, O 1·26% (on the original schist). The oil obtainable on distillation amounts to 40—70% of the C + H + N + O + 0·1S, varying according to the process and indicating that it is produced by heat from the org. material. C. A. S.

Catalytic reduction of tar phenols to aromatic hydrocarbons. I. T. Bahr and A. J. Petrick (Brennstoff-Chem., 1933, **14**, 161—165; cf. B., 1932, 326).—PhOH, the three cresols, the three dihydroxybenzenes, and α- and β-$C_{10}H_7$·OH have been reduced to the corresponding aromatic hydrocarbons by passing the vapour, mixed with excess of H_2, under atm. pressure, over a suitable Mo catalyst at 360—380°. At higher temp. (400—450°) the activity of the catalyst diminished rather rapidly. Commercial oils, *e.g.*, tricresol, tar phenols, and tar fractions containing phenols, were similarly reduced to hydrocarbons. The neutral oils produced consisted of 80—90% of the corresponding hydrocarbons, but contained also some compounds of high b.p. No loss of Me groups occurred from the cresols, and no appreciable hydrogenation of the aromatic nuclei took place. The reduction of cresols by this method gives pure PhMe free from C_6H_6 and hydroaromatic compounds. A. B. M.

Character of Mexican oils. E. F. Nelson and G. Egloff (Petroleum, 1933, **29**, No. 18, 7—9).—Data relating to the output, properties, and behaviour on cracking, of Mexican oils are tabulated. A Maranjos crude oil gave, on cracking, 40% of benzine (C_8H_{18} no. 67); the straight-run benzine (17·8% of the crude oil) had C_8H_{18} no. 38. A. B. M.

Gum formation in gasoline. I. Measurement of gum stability of gasoline. T. H. Rogers, J. L. Bussies, and P. T. Ward (Ind. Eng. Chem., 1933, **25**, 397—402).—A satisfactory gasoline should give $\not>$ 10 mg. of gum per 100 c.c. when tested by the A.S.T.M. method. The Voorhees test, the results of which are expressed as the no. of min. required for the rate of O_2 absorption at 100° under standard conditions to reach 1 c.c. per min., is the most satisfactory for determining the stability of gasoline, and results correlating this test with gum storage tests in glass bottles at 35° are shown. The rate of gum formation in Fe barrels vented to the air at 10° is roughly one half that in glass bottles at 35°, but the data obtained are irregular. For gasoline stored in large tanks the rate of gum formation is largely governed by the rate of dissolution of O_2. D. K. M.

Gum formation in gasoline. II. Control by antioxidants. T. H. Rogers and V. Voorhees (Ind. Eng. Chem., 1933, **25**, 520—523; cf. preceding abstract).—The antioxidant efficiency of a no. of compounds examined by the Voorhees method shows that the induction period is directly proportional to the concn. of antioxidant. The chemical nature of antioxidants is correlated with their effect in inhibiting gum formation. The readily oxidisable monosubstituted *p*-aminophenols are particularly effective. *p*-Benzylaminophenol being twice as sol. in gasoline as in H_2O and quite colour stable, generally producing an increase in the colour stability of the gasoline, possesses marked advantages over such compounds as α-$C_{10}H_7$·OH and polyphenols previously proposed as inhibitors. E. S.

Predicting stability of gasolines to ageing. C. Winning and R. M. Thomas (Ind. Eng. Chem., 1933, **25**, 511—516).—Results of present accelerated tests are correlated with those of storage tests. No single accelerated test predicts satisfactorily the resistance of gasolines to ageing. The best available procedure is a combination of the Cu-dish and breakdown tests. It is hoped to eliminate the former by including its desirable features in the breakdown test. At present breakdown at 100° is found by heating the gasoline under O_2 pressure in a steam-heated, stainless-steel bomb and recording the pressure–time curve. With similar gasolines the breakdown is satisfactorily given by the point at which a 2 lb./sq. in. drop in pressure occurs. The method can be adapted for breakdown determinations at lower temp., but these are of doubtful utility. A. H. E.

Use of synthetic methanol as motor fuel. D. A. Howes (J. Inst. Petroleum Tech., 1933, **19**, 301—331).—

Undiluted MeOH may be used in racing-car engines or MeOH–petrol mixture in normal engines. In unsupercharged engines having compressions of $> 15:1$ there was no pre-ignition, and use may therefore be made of the high latent heat of vaporisation of the MeOH. No evaporation occurs during the compression stroke, and this increases its power output and efficiency. A comparison of alcoholic and hydrocarbon fuels shows that MeOH has a high volumetric and thermal efficiency and is unequalled to give max. power output. Addition of MeOH (up to 20%) to a petrol–benzol mixture raises the power output, and there is no knocking with the 20% mixture at high compression ratios. MeOH is an excellent anti-knock material to add to commercial spirit, but the low solubility of MeOH in market spirit necessitates a blending agent. Experiments on blending agents for MeOH–gasoline mixtures at various temp. show that complete miscibility at all temp. above 0° was obtained when 10% of MeOH and 2·4% of $Bu^{\beta}OH$ were present. These blends have the advantage that they will dissolve out small quantities of H_2O normally separating out from petrol. This "H_2O-tolerance" (W.T.) depends on temp., concn. of MeOH, and excess of blending agent. A petrol–MeOH mixture stabilised with benzol of W.T. 3·5 c.c./gal. of H_2O at 0° was stable to —28° and gave increased acceleration and no knocking in motor-cycle engines; it answered equally as well as petrol in various types of automobile engines over a year's running trials.

C. E. M.

Solubility of ethyl alcohol in gasoline. O. C. Bridgeman and D. Querfeld (Ind. Eng. Chem., 1933, **25**, 523—525).—Crit. solution temp. (C.S.T.) within the range 65° to —65° for aq. solutions of EtOH (approx. 93—99 vol.-% of EtOH) in 23 gasolines are determined. The C.S.T. decreases markedly as the concn. of H_2O in the EtOH solution and the % of gasoline in the blend decreases. With straight-run fuels of the same volatility the C.S.T. vals. differ little from fuel to fuel and are approx. independent of the source of crude oil from which the gasoline is distilled. Cracked gasolines may show much lower C.S.T. vals. than straight-run products even of the same volatility. Topping a fuel so as to reduce the 90% temp. by approx. 40° or increasing the volatility at the lower end of the distillation curve markedly lowers the C.S.T. With few exceptions, none of the gasolines gave a C.S.T. val. low enough to make practical the use of blends containing up to 50% of EtOH unless the EtOH was almost entirely free from H_2O. Under such conditions other materials must be added to increase the solubility.

E. S.

Significance of the A. S. T. M. distillation curve. M. G. Blair and R. C. Alden (Ind. Eng. Chem., 1933, **25**, 559—562).—The A. S. T. M. (Engler) distillation curve for motor fuels (Amer. Soc. Test Mat. Standard Methods, D86—27) can be correlated with performance characteristics, and used to estimate composition, Reid v.p., *d*, and vapour-lock temp.

T. H. B.

Classification of liquid fuels for internal-combustion engines with mechanical injection. P. Dumanois (Compt. rend., 1933, **196**, 1003—1005).—In view of the unsuitability of the prescribed methods of determining the cetene or C_8H_{18} nos. (cf. B., 1932, 920; 1931, 328) of gas oils in a "C.F.R." motor, such an oil is mixed with petrol in the ratio 15 : 85, forming a mixture which behaves satisfactorily in such a motor working at 500 r.p.m. with a cooling-fluid temp. of 150°, and gives a C_7H_{16} no. agreeing well with the cetene no. determined by the prescribed method. These facts support the author's theory of the cause of detonation in such motors (cf. A., 1928, 248).

C. A. S.

"Oxidising agent" and peroxide in an Otto cycle engine cylinder. S. Steele (Ind. Eng. Chem. [Anal.], 1933, **5**, 202—206).—Qual. and quant. tests on the cylinder contents of a Ricardo E35 engine, from different parts of the compression space and at different times during the compression, exhaust, and inlet strokes, are described. Under various combinations of widely different conditions the complete absence of peroxide in the engine cylinder is definitely established. An "oxidising agent" of unknown identity may be determined by means of a slightly acid solution of KI and is assumed to indicate a definite stage in the progress of combustion of the three fuels used.

E. S. H.

Formation of liquid hydrocarbons from acetylene. III. Production of benzine by successive electrical and catalytic transformation of coke-oven gas. K. Peters and L. Neumann (Brennstoff-Chem., 1933, **14**, 165—168; cf. B., 1929, 966).—Coke-oven gas was submitted to an electric discharge under reduced pressure and thereby converted into a gas containing 7% of C_2H_2 (cf. B., 1929, 703), which was then passed through a contact apparatus consisting of four electrically-heated brass tubes (50 mm. in diam.) in parallel, packed with an Fe–Ni catalyst, the max. temp. in which was maintained at 250°. 26·5 cu. m. of coke-oven gas yielded 31·8 cu. m. of gas after electrical treatment; this in turn yielded 1700 c.c. of liquid unsaturated and aromatic hydrocarbons, of which 75% boiled below 150°. The small quantity of HCN in the electrically treated gas was converted into NH_3. The end gas contained 5% of C_2H_4. The reaction in the contact apparatus was exothermic and, although it was not particularly sensitive to temp. changes, the efficiency of conversion was higher the more uniform the temp. in the contact apparatus; thus the use of tubes of greater diam. led to lower yields of liquid products.

A. B. M.

Conradson test for motor[-lubricating] oils. C. Ehlers (Petroleum, 1933, **29**, No. 19; Motorenbetr., **6**, 2—4).—In blends of oils of different viscosities the C residue (Conradson) increased with increasing viscosity of the blend. There was, however, no correlation between the C residue of an oil and its behaviour in the engine, and the comparative val. of oils, particularly oils of varying origin, cannot be estimated on the basis of this test only. The C residue of an oil increased with its period of use in the engine, and also on heating in the presence of O_2 in the laboratory.

A. B. M.

Oil viscosimeter.—See I. **Utilisation of CH_4. MeOH from water-gas.**—See III. **Corrosion of steel pipes. Liquid fuels and Al.**—See X. **Photoelectric colorimeter for petroleum products.**—See XI. **Oil-resistant rubber.**—See XIV. **Lignite as manure.**—See XVI.

PATENTS.

Production of dehydrated and charred lump lignite. E. P. SCHOCH (U.S.P. 1,871,862, 16.8.32. Appl., 9.8.29).—Lignite is soaked in thin petroleum oil at a temp. sufficient to cause evolution of H_2O, the excess of oil is drained away, and the lignite heated to 350—750° in a closed container. The resulting lumps retain their original form and are of good mechanical strength. B. M. V.

Making [coal] briquettes. R. E. WILLARD, Assr. to BRIQUET ENG. Co. (U.S.P. 1,871,104, 9.8.32. Appl., 28.4.30).—The binder (*e.g.*, asphaltic material) is incorporated while the coal is heated to just below its decomp. point by contact with steam; the mixture is then cooled by H_2O sprays and pressed. B. M. V.

Fuel briquette. E. O. E. GAUPHOLM (U.S.P. 1,872,135, 16.8.32. Appl., 15.4.30).—To a briquette composition is added a flux, *e.g.*, $Na_2B_4O_7$, that will cause the ash to form clinker. B. M. V.

Carbonisation of fuel briquettes. GAS LIGHT & COKE Co., and N. E. SIDERFIN (B.P. 390,827, 10.10.31 and 28.5.32).—Briquettes of coal or coke, bound with pitch or other suitable binder, are carbonised at high temp. in narrow vertical retorts under such conditions that the raw briquettes are first heated, while at rest in the upper part of the retort, until a layer of hard coke is formed on their surface, carbonisation being subsequently completed in the lower sections of the retort. A. B. M.

(A) **Coking retort oven.** (B) **Method of operating a coke-oven battery.** J. BECKER, Assr. to KOPPERS Co. (U.S.P. 1,865,161—2, 28.6.32. Appl., 5.8.21).—(A) Ovens of the cross-regenerator type are so designed that, when operating on coke-oven gas, only part of the regenerative area is employed for preheating the air at any one time, the remainder remaining inoperative; the function of these parts is then reversed, the latter being used for preheating the air and the former remaining inoperative. When the oven is operating on producer gas, one part of the regenerative area is used for preheating gas and the other for preheating air as in usual practice. (B) The same principle is applied to ovens of the type described in U.S.P. 1,374,546 (B., 1921, 378A). A. B. M.

Low-temperature distillation and coking. J. GELLER (B.P. 391,245, 26.11.31. Ger., 26.11.30).—A setting of vertical retorts is annular in plan, heating gases passing through both radial and circular passages in a combination of horizontal and vertical motion. The whole setting may be rotated to bring the sector-shaped retorts in register with stationary charging and discharging devices in turn. To obtain even heating the gases are circulated in large quantity by a fan, fresh combustion gases being added to maintain the temp. B. M. V.

Manufacture of gas and carbonised fuel. J. F. BRYNE, Assr. to KOPPERS Co. OF DELAWARE (U.S.P. 1,872,883, 23.8.32. Appl., 21.6.28).—A generator for water-gas or combined water-gas and coal gas is operated with an upward blow of air and both up and down runs of steam, the fresh coal being added in comminuted form suspended in the steam in excess of the quantity required for that stage of gasification. Either ash or ash and coke may be removed by means of a H_2O-cooled device at the base. B. M. V.

Continuous production of high-heating-value gas. W. L. DE BAUFRE (U.S.P. 1,866,399, 5.7.32. Appl., 9.7.27).—Finely-divided coal is introduced into the top of a vertical gas-generating chamber (*A*) down which it falls freely, passing first through a heating and distillation zone and then through a reaction zone (*B*). In *B* it is subjected to the action of O_2 (which may be mixed with air) and steam, the O_2 being admitted at an intermediate level of *A* and the steam at a lower level. Oil is introduced into the upper part of *A* in order to enrich the gas. The O_2 and steam supplies to *A* are automatically regulated by a device controlled by the temp. in *B*. A. B. M.

Recovery of light oils [from coal-distillation gases]. S. P. MILLER and E. H. ELLMS, Assrs. to BARRETT Co. (U.S.P. 1,864,749, 28.6.32. Appl., 18.2.30).—A coal-tar distillate of high b.p. (*e.g.*, 250—300°) is employed as a wash oil to remove light oils from gases. After stripping and recirculating several times it may be disposed of as creosote oil or blended with other coal-tar products. H. S. G.

Oil-gas generation. A. P. THURSTON (B.P. 391,390, 25.11.32).—Steam is blown downwardly through a ring of jets into a retort heated externally to 975°, the wall being preferably of Ni or other metal having catalytic properties. The oil is intermittently injected along the axis of the shield of steam so that it does not come in contact with the retort until the temp. of dissociation of H_2O has been reached. B. M. V.

Production of combustible gaseous mixtures. POWER-GAS CORP., LTD., N. E. RAMBUSH, and A. T. GRISENTHWAITE (B.P. 391,144, 17.10.31).—For the heating of retorts for the distillation of coal, producer gas (*A*) is not rich enough, blue water-gas (*B*) from the steam-run is rich enough but involves waste of CO in the gases from the air blows (*C*), and coal gas (*D*) is too valuable. Claim is made for the use of a mixture of *B*, with *C* from the later stages preferably blown at a reduced rate and with H_2O also if desired, and a little of *D* to adjust the calorific val. B. M. V.

Manufacture of mixed oil gas and producer gas. W. W. WILLIAMS, Assr. to WILLIAMS OIL-O-MATIC HEATING CORP. (U.S.P. 1,865,664, 5.7.32. Appl., 4.4.29).—A mixture of oil, air, and H_2O is atomised into a controlled stream of supplementary air (*A*), the mixture is ignited, and the flame directed on to the top of a bed of refractory material (*B*) which is thereby heated to incandescence. The supply of *A* is automatically controlled in accordance with the temp. in the chamber, conditions being so adjusted that the unburned oil vapours are cracked as they pass through the heated bed of *B* to give the desired mixture of oil and producer gas. A. B. M.

Production of hydrogen and carbon monoxide [mixtures from hydrocarbon gases]. HYDRO-NITRO SOC. ANON. (B.P. 390,849, 5.10.31. U.S., 3.10.30).—A mixture of CH_4 and H_2O is passed up through one and down through a second vertical chamber packed with refractory material, the latter having been heated by the combustion of gas in the chambers, in such a manner as to heat the upper zones to 1200—1500° and to give a falling temp. gradient down each chamber.

A. B. M.

(A) Dehydration and distillation of tar. (B) Apparatus for distilling tar. (A) E. H. Ellms, (B) S. P. Miller, (A, B) Assrs. to Barrett Co. (U.S.P. 1,871,596 and 1,871,550, 16.8.32. Appl., [A] 16.5.27, [B] 3.6.27).—Tar is distilled by the sensible heat of gases from a no. of coke ovens of a range. In (A) the heat exchange is indirect, the tar flowing in a spiral course around the outside of the gas uptakes. In (B) there is direct contact, a no. of primary stills being placed in the uptakes, the residues, gases, and vapours from which pass to a common large still. B. M. V.

(A) Production and cooling of bituminous emulsions. (B) Cooling of molten bitumen. L. Kirschbraun (U.S.P. 1,866,503—4, 5.7.32. Appl., [A] 24.8.29. [B] 29.5.30. Cf. U.S.P. 1,615,303; B., 1927, 301).—(A) The molten bitumen before being fed to the emulsifier is passed through a cooler wherein its temp. is reduced to 30—60° above that of the mass undergoing emulsification, the latter temp. being preferably maintained at about the m.p. of the bitumen. (B) The cooler consists of a chamber (*A*) into which the hot bitumen is fed, containing a hollow rotating cylinder (*B*) through which a cooling medium is circulated, and a larger chamber (*C*) for holding the bulk supply of cooled bitumen. *B* picks up a thin film of the bitumen from *A* and delivers it continuously into *C*. A. B. M.

Manufacture of aqueous asphalt emulsion. L. G. Thompson, Assr. to Amer. Bitumuls Co. (U.S.P. 1,861,826, 7.6.32. Appl., 11.7.28. Austral., 30.8.27).—An aq. solution ($<$ 1%) of NaOH, equal in amount to 40—50% of the final product, is heated to about 93°, vigorously stirred, and a small part of the total asphalt added in a molten condition, followed by the addition of oleic acid ($<$ 1%) and then the major portion of the asphalt. The stirring and maintenance of temp. are continued until emulsification is complete and a thin, fluid, asphaltic composition is obtained. H. S. G.

Production of phosphoric esters of tar acids. F. S. Granger, Assr. to Combustion Utilities Corp. (U.S.P. 1,869,312, 26.7.32. Appl., 13.12.28).—Coal-tar distillates are heated with $POCl_3$ (in amount $<$ that chemically equiv. to the tar acids present) and then distilled under vac. The fraction boiling at $\nless$ 245° consists of triaryl phosphates. The tar distillates may also be heated with H_3PO_4 and distilled under vac. to 250°. The residue is then made alkaline and the neutral aryl phosphate extracted with petrol. The liquid is acidified and aryl H phosphates are extracted with a suitable solvent, *e.g.*, Et_2O, C_6H_6. D. K. M.

Manufacture of concentrated ammonia liquor. M. Shoeld, Assr. to Koppers Co. of Delaware (U.S.P. 1,872,829, 23.8.32. Appl., 17.5.29).—NH_3 vapours at atm. pressure and temp. are absorbed in H_2O or returned dil. liquor, the solution is distilled under pressure, and the vapours are condensed under pressure to form 50% aq. NH_3; the residual liquor from the still after reduction of pressure and temp. is re-used for absorption.

B. M. V.

(A) Purification of tar-acid-bearing oils. (B) Recovery of resin from residual oil. S. Caplan, Assr. to Combustion Utilities Corp. (U.S.P. 1,868,447—8, 19.7.32. Appl., [A] 25.9.28, [B] 26.11.28).—(B) Colour-producing compounds and deleterious NH_4 compounds are removed by extracting the oil with several times its vol. of H_2O at approx. room temp. (B) The hydrocarbon oil component of a tar distillate containing sol. or colloidal resinous condensation products is agitated with light petroleum under conditions which avoid the conversion of the resinous compounds into the infusible form, and the pptd. resin is subsequently separated from this solution. H. S. G.

Cleaning of oil wells. E. M. Adams, W. C. Gangloff, and G. C. Spencer, Assrs. to Drackett Chem. Co. (U.S.P. 1,870,320, 9.8.32. Appl., 16.3.32).—Paraffin and/or asphaltic obstructions are removed by pumping down substances which will combine with evolution of heat and pressure on the addition of H_2O; *e.g.*, $NaNO_3$, NaOH, and an acid are sent down separately in an oil vehicle and followed by H_2O. B. M. V.

Method and reagent for treating wet oils. J. C. Walker, Assr. to Empire Oil Refining Co. (U.S.P. 1,873,165, 23.8.32. Appl., 27.1.28).—An inhibitor for H_2O-in-oil emulsions comprises a hydrocarbon-substituted derivative of a polycyclic sulpho-aromatic compound with a small proportion of a OH-derivative of a hydrocarbon which has a low f.p. B. M. V.

Stills and the like and the operation thereof. W. J. Tennant. From Silica Gel Corp. (B.P. 391,142, 16.10.31).—Solid deposits, *e.g.*, $C_{10}H_8$, are removed from the condenser (*A*) of an apparatus for the distillation of hydrocarbons by intermittent washing with a solvent (I), added to the vapours in the final stages of distillation. The liquid seal of the outlet of *A* is drained at the beginning of a run to avoid loss of light hydrocarbons by the air blowing through, and is restored by the first runnings from *A*. (I) may be some of the condensate previously obtained. B. M. V.

Preventing corrosion in oil-refining equipment. W. G. Laird, Assr. to Heat Treating Co. (U.S.P. 1,873,136, 23.8.32. Appl., 27.11.26).—The oil is first dehydrated, then passed to a topping still preferably heated by cracking-still gases, and the residues are mixed with CaO ($\nless$ twice the equiv. of the S in the oil), the mixture passing to the other stills. B. M. V.

Coking of heavy oils. O. F. Campbell and E. C. Herthel, Assrs. to Sinclair Refining Co. (U.S.P. 1,872,884, 23.8.32. Appl., 7.3.29).—The oil is coked in a cylindrical vessel around the interior of which a chain (*A*) is coiled. At the completion of coking *A* is dragged out, leaving the coke in the form of a single block but quite free from the wall. A frame for supporting *A* is described. B. M. V.

(A) Refining of distillates. (B) Distillation of hydrocarbons and production of coke. (C) Cracking and coking. (D) Treatment [refining] of petroleum materials. J. D. Fields (U.S.P. 1,864,719—20 and 1,864,686—7, 28.6.32. Appl., [A, B] 29.6.31, [C] 8.3.30, [D] 24.9.31. Can., Venezuela, Mexico [D] after 1.8.31).—(A) Petroleum distillates are refined by separating H_2O and passing them through layers of an alkali metal, *e.g.*, Na, which acts as a catalyst. The metal is periodically washed with a mixture of EtOH and C_6H_6. (B) A hard ferruginous coke, not adherent to the still, and a distillate are obtained by the distillation of a mixture of petroleum oil, especially an oil with a high initial b.p., comminuted vegetable matter, *e.g.*, sawdust, and a finely-divided Fe ore low in S. (C) A soft coke is obtained if the Fe ore is omitted. (D) The processes of (A) and (B) are worked together. By varying the conditions of distillation different products, *e.g.*, kerosene, lubricating oil, may be obtained. D. K. M.

Distillation of crude oil. T. J. Ryan (U.S.P. 1,862,942, 14.6.32. Appl., 1.6.27).—Crude hydrocarbon oil is heated in a primary still to 149—177° and discharged through a nozzle into a tower (*A*) the vapours from which pass successively through two dephlegmators to a condenser. In a secondary still with similar accessories more crude oil and the reflux from *A* are heated to 205—233°. Fractions, *e.g.*, gasoline, naphtha, kerosene, which require no further purification are obtained from the condensers, dephlegmators, and secondary tower. D. K. M.

Refining of crude oil. H. E. Widdell (U.S.P. 1,865,494, 5.7.32. Appl., 22.12.27).—When the vapours obtained by heating a paraffin-base oil from which light hydrocarbons have been removed are fractionally cooled, oil free from wax, oil and pressable wax, and oil and unpressable wax are obtained. D. K. M.

Purification of oil vapours. G. B. Coubrough, Assr. to Lummus Co. (U.S.P. 1,864,583, 28.6.32. Appl., 28.6.27).—Oil vapours are washed by admitting H_2O (in which reagents, *e.g.*, NaOH or NaCl, may be dissolved) into the mid-portion of a rectifying column when a single liquid is being fractionated, or into the column below the point of separation when two or more liquids are being separated. The fouled H_2O is trapped and withdrawn. D. K. M.

Cracking of hydrocarbons. H. L. Pelzer, Assr. to Sinclair Refining Co. (U.S.P. 1,865,206, 28.6.32. Appl., 16.12.29).—A high-boiling hydrocarbon oil is subjected to a cracking temp. $\not<$ 510° and from the reaction products a gasoline condensate and a gas mixture (*A*) including unsaturated hydrocarbons are separated. *A* is then treated with H_2SO_4 and the resulting composite acid mixture (*B*) and composite oil mixture (*C*) are separated. A polymerised gasoline fraction is distilled from *C*, whilst hydrolysis of *B* produces a second composite oil mixture from which an oxidised gasoline fraction can be distilled. The various gasoline fractions so produced are combined with the original gasoline condensate to produce a motor fuel of high crit. compression. H. S. G.

Cracking of hydrocarbons by contact with hot gases. W. K. Lewis, Assr. to Standard Oil Development Co. (U.S.P. 1,865,195, 28.6.32. Appl., 15.5.28).—Producer gas manufactured at 1200—1800° is diluted with a cooler non-oxidising gas and injected into a reaction zone into which hydrocarbons are introduced and thermally decomposed at 550—600°. The reaction product is withdrawn, the gasoline constituents are separated, and the residual gases and vapours are discharged for return in part to the system. H. S. G.

Cracking and treatment of hydrocarbons. M. B. Schuster (B.P. 391,238, 13.11.31).—Topped crude oil, or gas oil, is passed through a cracking still under $>$ 100 lb./sq. in. and $>$ 391° to a dephlegmator wherein a distillate heavier than gasoline is condensed. This is pumped through a separate continuous tube-still in which a higher pressure and temp. are maintained. Gasoline is separated from the substantially heavier and higher-b.p. products, and these are returned to the initial cracking stage. H. S. G.

Thermal decomposition of hydrocarbons. N. V. de Bataafsche Petroleum Maats., Assees. of F. M. Pyzel (B.P. 391,532, 22.12.31. U.S., 18.8.31).—CH_4, or a hydrocarbon gas containing it (*e.g.*, natural gas), is cracked and further amounts of raw gas are injected into the stream of cracked products at one or more points in order to utilise the heat contained therein for further cracking. H. S. G.

Pyrolysis of hydrocarbons. Ruhrchemie A.-G. (B.P. 391,206, 14.10.31. Ger., 17.12.30).—Conversion of CH_4 and other gaseous aliphatic hydrocarbons into other hydrocarbons, especially C_2H_2, is effected at high temp. and under vac., and in the presence of catalysts, in conversion chambers (*A*) which are heated by burning gases in adjacent chambers in which a vac. ($\not>$ 0·1 atm.) approx. the same as, or slightly $<$, that in *A* is employed and automatically regulated. H. S. G.

Conversion of hydrocarbons into other hydrocarbons of lower mol. wt. H. Dreyfus (B.P. 390,846, 1.10.31).—Oils are cracked by being heated, preferably to 650—800°, in thin (0·05—0·25 in.) annular sheets formed between metal cylinders, the apparatus being so designed that both surfaces of the annular space are heated by hot gases or superheated steam. The walls of the annular space may be constructed of, or coated with, material having a catalytic effect on the reaction, *e.g.*, Ni, Cu, Fe, or alloys of Fe, Cr, and Ni. A. B. M.

Production of normally liquid hydrocarbons from gaseous or lower-boiling hydrocarbon materials. P. K. Frolich, Assr. to Standard Oil Development Co. (U.S.P. 1,869,681, 2.8.32. Appl., 24.3.30).—Gaseous paraffins, *e.g.*, C_2H_6, C_3H_8, C_4H_{10}, such as are obtained in cracking petroleum oil are converted into olefines and H_2 by heating at 600—1000°, with or without pressure, in the presence or absence of a catalyst, *e.g.*, Zn with Cr, Mo, or W. H_2 is removed by liquefaction and rectification or by preferential combustion with air at 250—450°, with or without pressure, in the presence of a catalyst, *e.g.*, Cu, Pb, Ni, Sn, or the metal oxide. The olefines are polymerised by heating at 500—900°/300—1000 lb. per sq. in., yielding gasoline. D. K. M.

Partial oxidation of gaseous hydrocarbons. W. K. Lewis, Assr. to Standard Oil Development Co. (U.S.P. 1,870,816, 9.8.32. Appl., 21.3.28).—Gaseous hydrocarbons and air are passed under pressure at raised temp. into a zone of partial oxidation. The resulting products are removed and cooled by expansion, and the liquid and vapour phases so obtained are rectified to yield a gas containing N_2 and hydrocarbons including

CH_4 and C_2H_6, and a liquid comprising normally liquid oxygenated products. The gas is scrubbed free from CO_2, then recompressed, and cooled to a temp. sufficiently low to liquefy the greater part of the CH_4, the product being rectified to produce N_2 gas substantially free from hydrocarbon gas and liquid hydrocarbons which are returned to the process, the N_2 being separated. H. S. G.

Treatment of hydrocarbons. I. H. Jones, Assr. to Koppers Co. of Delaware (U.S.P. 1,872,463, 16.8.32. Appl., 1.10.27).—In order to render fluid the acid sludge obtained in the purification of light oils from coal gas, the oils are washed with a much greater amount than usual (4—7%) of H_2SO_4; the sludge so produced is fluid and remains insol. in dil. acid (which is washed out), but will dissolve or can be dispersed in additional H_2O at 80°. B. M. V.

Treatment of hydrocarbons. P. J. Carlisle and C. R. Harris, Assrs. to Roessler & Hasslacher Chem. Co. (U.S.P. 1,862,003, 7.6.32. Appl., 25.11.27).—The hydrocarbons are passed substantially as vapours into a treating medium (*A*) comprising an alkali metal (*e.g.*, Na) suspended in a liquid hydrocarbon having a b.-p. curve higher than that of the material introduced. The treated hydrocarbons are removed from *A* partly as vapour and partly as an effluent which serves to carry away by-products and prevent their accumulation in the treating vessel (*B*), but from which substantially all non-reacted *A* is removed before such discharge, the supply of *A* being continuously retained suspended in the hydrocarbons within *B*. The by-products are subsequently separated from the liquid effluent, which is recycled through *B* with additional *A* if necessary. H. S. G.

Refining of hydrocarbons. T. T. Gray, Assr. to Gray Processes Corp. (U.S.P. 1,865,467, 5.7.32. Appl., 6.3.29. Cf. U.S.P. 1,340,889; B., 1920, 651).—The hydrocarbon vapour is passed through a bed of absorbent material so rapidly that the polymerides of the unstable substances are removed by entrainment. They are then separated from the vapour. D. K. M.

Refining of hydrocarbons produced by destructive hydrogenation. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 391,283, 19.2.32).—The hydrocarbons are washed with an aq. 2—15% alkaline solution, while under pressure, after the H_2 has been removed but prior to coming in contact with air or O_2. H. S. G.

Refining of liquid hydrocarbons by means of liquid SO_2. Edeleanu Ges.m.b.H. (B.P. 391,308, 18.4.32. Ger., 1.5.31).—H_2O is removed from the circulating SO_2 in an Edeleanu installation by leading the SO_2 vapours escaping from the condenser pressure evaporator of the extract, wherein the pressure is about 4—6 atm., through a drying apparatus or rectification column, or by separately condensing these SO_2 vapours and redistilling the whole or a part of the condensate directly against the condenser pressure (or at normal pressure) under the interposition of a compressor. H. S. G.

Treatment of hydrocarbon oils. R. Cross, Assr. to Cross Development Corp. (U.S.P. 1,865,235, 28.6.32. Appl., 28.6.26).—Desulphurisation and decolorisation of hydrocarbon oils is brought about by treating them in a vapour phase with an alkaline-earth metal (*e.g.*, Ca) in liquid or comminuted form or incorporated with argillaceous material. H. S. G.

Treatment of [hydrocarbon] oil and reagents [therefor]. G. H. Burruss, Assr. to Col-Tex Refining Co. (U.S.P. 1,863,967, 21.6.32. Appl., 12.12.28).—The sulphide sludge resulting from the "doctor" treatment of petroleum oils is set aside until the greater part of the entrained oil can be separated, and is then regenerated by adding fresh litharge (1 lb. per 100 gals. of sludge) and blowing with air or gases containing O_2 for 10—15 min. H. S. G.

Conversion of organic sulphur compounds [in gaseous hydrocarbons]. Standard Oil Development Co., Assees. of R. Rosen and E. Lieber (B.P. 391,660, 16.8.32. U.S., 18.9.31).—The S compounds are converted into H_2S by passage over an FeS catalyst (with or without a promotor) at 337—482°. H. S. G.

Treatment of hydrocarbon residues containing inorganic substances. R. T. Goodwin, Assr. to Standard Oil Development Co. (U.S.P. 1,865,001, 28.6.32. Appl., 3.7.28).—The residue derived from cracking a hydrocarbon oil mixed with a solid alkaline substance (*e.g.*, CaO) is treated at raised temp. with dil. H_2SO_4 in non-sludge-forming concn. and the pptd. material is removed from the resultant heavy oil. H. S. G.

Neutralisation of acids in [hydrocarbon] oils. H. H. Moreton, Assr. to O. B. Englisch and C. F. Craig (U.S.P. 1,861,711, 7.6.32. Appl., 8.10.28).—The acid-treated oil is treated with dry, powdered, non-absorbent SiO_2 (200—400-mesh) the particles of which are coated with NaOH. H. S. G.

Refining of hydrocarbon oils. J. C. Morrell and G. Egloff, Assrs. to Universal Oil Products Co. (U.S.P. 1,868,333, 19.7.32. Appl., 5.6.31).—A hydrocarbon distillate is treated with a quantity of liquid SO_2 sufficient to dissolve the unsaturated hydrocarbons but insufficient substantially to affect the saturated hydrocarbons, and the two layers thereby formed are separated. The saturated hydrocarbons are treated with H_2SO_4 to remove objectionable S compounds; similarly, the unsaturated hydrocarbons are removed from the SO_2 solution and separately treated with acid and alkali. These two treated fractions are subsequently recombined. H. S. G.

Purification of petroleum oils. D. E. Day (U.S.P. 1,867,908, 19.7.32. Appl., 12.6.29).—A gasoline stock is mixed with conc. aq. NaOH or KOH and passed through a heating coil under sufficient pressure to prevent substantial evaporation at 177—260°. The pressure is then immediately released and the purified gasoline stock separated by distillation from the excess alkali and the polymerised products. H. S. G.

Treatment of petroleum oils. F. G. Graves, Assr. to Standard Oil Co. of California (U.S.P. 1,867,697, 19.7.32. Appl., 2.3.27).—A petroleum distillate containing gum-forming substances is heated and held under pressure in contact with metallic Cu free from CuO, subsequently being separated therefrom and mixed with an adsorbent clay, from which it is finally removed by distillation. H. S. G.

Treatment of wet [petroleum] oils. J. C. Walker, Assr. to Empire Oil & Refining Co. (U.S.P. 1,863,143, 14.6.32. Appl., 13.11.26).—A reagent comprising an aq. solution or suspension of a mixture of the alkali or NH_4 salts of the products derived from the sulphonation of crude cymene (*e.g.*, spruce turpentine) is either forced into the oil well in such manner that it mingles with the liquid therein, or is added to the liquids after they have been pumped from the wells, in order to inhibit the formation of emulsions or to break them if already formed. H. S. G.

Dehydration of [petroleum] emulsions. H. F. Fisher, Assr. to Petroleum Rectifying Co. of California (U.S.P. 1,864,721, 28.6.32. Appl., 30.8.26).—The cutting of emulsions by passing them between electrodes is improved by impressing a high potential of short duration on the normal potential of standard wave form and frequency. D. K. M.

Treatment of petroleum [to remove sulphur compounds]. W. F. Bleecker (U.S.P. 1,862,952, 14.6.32. Appl., 1.5.28).—The oil is floated on the surface of an electrolyte (*e.g.*, brine) adapted to produce an oxidising gas and H_2 by electrolysis, and the gases are introduced into the petroleum in separate and distinct steps. H. S. G.

Treatment of petroleum acid sludges. F. R. Moxer and J. Greutert, Assrs. to Shell Development Co. (U.S.P. 1,862,060, 7.6.32. Appl., 8.8.28).—A petroleum asphalt is heated to 120° and an approx. equal amount of acid sludge is added. The mixture is agitated and the temp. slowly raised to 250° and maintained until substantially complete decomp. of the acid compounds of the sludge is effected and a final product resembling blown asphalt is obtained. H. S. G.

Oxidation of oils. M. L. Chappell and T. H. Dowlen, Assrs. to Richfield Oil Co. of California (U.S.P. 1,865,081, 28.6.32. Appl., 26.11.29).—Petroleum oil residuum (*A*) is continuously introduced and passed in a regulated stream through a series of distinct but connected compartments within a container holding a bulk supply of the material maintained at 204—288°. Regulated streams of air cooled to a temp. sufficient to extract the exothermic heat of the oxidising reaction are introduced and commingled with *A*, residual air and volatile products being withdrawn from each compartment and discharged from the system. The temp. of the cooled air and that of *A*, and its rate of passage through the system, are regulated so that *A* is oxidised to the required degree before its discharge. H. S. G.

Refining of petroleum distillates. L. P. Chebotaref, Assr. to Texas Co. (U.S.P. 1,872,679, 23.8.32. Appl., 27.12.27).—After the usual treatments with H_2SO_4, NaOH, and, if desired, PbO, the distillates are treated with saturated $NaHCO_3$ solution for removal of NH_2-compounds. B. M. V.

Separation of wax from oil. V. Voorhees, Assr. to Standard Oil Co. (U.S.P. 1,862,874, 14.6.32. Appl., 6.10.31).—Oil is mixed with one or more alkyl or alkylene ethers, *e.g.*, MeOEt, ethylene oxide, with or without the addition of one or more solvents, *e.g.*, C_3H_8, C_4H_{10}, in the liquid phase under pressure, and the mixture is cooled to −23° by self-evaporation of some of the diluent(s). The deposited wax is removed by filtration. D. K. M.

Production of motor spirit containing metallo-organic catalysts and self-made anti-knocking compounds. C. Ellis, Assr. to Ellis-Foster Co. (U.S.P. 1,867,814, 19.7.32. Appl., 29.9.24).—Motor spirit obtained by cracking hydrocarbon oil and containing aromatic, naphthenic, and olefinic hydrocarbons is partly oxidised and nitrated (HNO_3) and then treated with nascent H, to form amines. Metallic substances, *e.g.*, compounds of Pb, Hg, Cr, Sb, As, Sn, especially chlorides, and/or chlorinated hydrocarbons, *e.g.*, $C_6H_4Cl_2$, may be added. D. K. M.

Gaseous fuel mixture. G. C. Quelch, Assr. to Union Carbide & Carbon Res. Labs., Inc. (U.S.P. 1,863,636, 21.6.32. Appl., 8.6.26).—A fuel suitable for storage at 1800 lb. per sq. in. and expansion to 5 lb. per sq. in. before use in blow-pipe jets consists of H_2 38—45, C_2H_6 1, CH_4 61—54%. D. K. M.

(A) Treatment of lubricating oils with an activated clay and water. (B) Manufacture of a superior [lubricating] oil. W. S. Baylis, Assr. to Filtrol Co. of California (U.S.P. 1,866,590—1, 12.7.32. Appl., [A] 17.3.28, [B] 4.9.28).—(A) A mixture of the oil with H_2O (1—15%) and activated clay (3—10%) is heated under pressure to a temp. slightly below its flash point, and maintained at that temp. until partial decolorisation takes place without oxidation of the oil. The pressure is reduced by venting to remove H_2O vapour, and additional activated clay is added to complete decolorisation of the oil; thereafter the clay and oil are separated. (B) An acid-activated, powdered clay adsorbent is mixed with 20—150 wt.-% of the oil to be refined and heated to 93—400°. The mixture is allowed to cool during 10 hr. and then extracted with Pennsylvania benzine free from aromatic hydrocarbons, and the solvent removed from the refined oil. H. S. G.

Reactivation of [bleaching] clay. E. R. Lederer (U.S.P. 1,872,988, 23.8.32. Appl., 31.5.30).—Clay that has been used for filtration of oils is leached with petrol, naphtha, etc., filtered, dried at a low temp. to avoid fire risk, and finally ignited at a moderate temp. B. M. V.

Drawing lubricants. Emulsion. Lubricating compound. Preparation of lead mahogany soap lubricant. (A, B) E. W. Adams, (C, D) M. H. Arveson, Assrs. to (A—C) Standard Oil Co., (D) Standard Oil Co. (Indiana) (U.S.P. 1,871,939—42, 16.8.32. Appl., [A] 25.7.27, [B] 4.9.28, [C] 12.7.29, [D] 12.5.30).—A no. of emulsified lubricants basedon mineral oil, animal fat, and alkali-metal soap formed from mineral oil sulphonates are described. B. M. V.

Lubricating grease. F. W. Sullivan, jun., and M. H. Arveson, Assrs. to Standard Oil Co. (U.S.P. 1,871,864, 16.8.32. Appl., 4.12.29).—An example of a no. of compositions claimed is: cottonseed fatty acid 16, crude montan wax 21·4, $Ca(OH)_2$ 3·5, NaOH 0·36, heavy black mineral oil 58·2, H_2O 2·7%. B. M. V.

Production of lubricating oil. T. W. Doell, Assr. to Standard Oil Co. of California (U.S.P. 1,867,695, 19.7.32. Appl., 24.8.27).—A mixture of a metallic salt of a sulphonic or sulphoricinoleic acid and a Pb salt of an unsaturated fatty acid (preferably oleic) is dissolved in a mineral lubricating oil in quantity insufficient materially to affect the viscosity. H. S. G.

Green-bloom oil. H. G. Smith, Assr. to Gulf Refining Co. (U.S.P. 1,868,473, 19.7.32. Appl., 26.7.29).—A green bloom is imparted to lubricating oils by the addition thereto, after acid treatment and neutralisation, of 0·2—0·5 vol.-% of clarified residual oil remaining after the distillation of a naphthenic gas oil with $AlCl_3$, then washing the oil with H_2O to free from soaps, and drying. H. S. G.

Cracking of hydrocarbons. E. W. Isom, Assr. to Sinclair Refining Co. (U.S.P. 1,872,955, 23.8.32. Appl., 16.4.29).

Operation of cracking-coil installations [for hydrocarbon oils]. E. W. Luster, Assr. to Standard Oil Development Co. (U.S.P. 1,870,855, 9.8.32. Appl., 25.9.29).

Oil-heating still. A. E. Harnsberger, Assr. to Gyro Process Co. (U.S.P. 1,882,579, 11.10.32. Appl., 27.12.29).

Oil-rectifying apparatus. M. Czarny and F. C. Frolander, Assrs. to Capilizer Holding Corp. (U.S.P. 1,885,333, 1.11.32. Appl., 13.11.28).

Apparatus for distilling hydrocarbon oils. F. A. Howard, W. K. Lewis, and H. M. Noel, Assrs. to Standard Oil Development Co. (U.S.P. 1,882,606, 11.10.32. Appl., 23.10.28).

[Hydrocarbon] oil converter. A. E. Harnsberger, Assr. to Gyro Process Co. (U.S.P. 1,885,716, 1.11.32. Appl., 25.1.30).

Apparatus for converting hydrocarbons. R. T. Pollock, Assr. to Universal Oil Products Co. (U.S.P. 1,887,039, 8.11.32. Appl., 26.5.24).

Hydrocarbon oil conversion. J. D. Seguy, Assr. to Universal Oil Products Co. (U.S.P. 1,884,886, 25.10.32. Appl., 27.1.27).

Hydrocarbon oil conversion. C. P. Dubbs, Assr. to Universal Oil Products Co. (U.S.P. 1,888,028, 15.11.32. Appl., 4.4.27).

Conversion of [hydrocarbon] oil. C. L. Smith and C. B. Watson, Assrs. to Pure Oil Co. (U.S.P. 1,887,047, 8.11.32. Appl., 22.3.28).

Conversion of hydrocarbon oils. E. W. Beardsley, Assr. to Petroleum Conversion Corp. (U.S.P. 1,883,744, 18.10.32. Appl., 2.4.28).

Converting [hydrocarbon] oils and simultaneously recovering asphalt. E. W. Beardsley and A. P. Sachs, Assrs. to Petroleum Conversion Corp. (U.S.P. 1,883,745, 18.10.32. Appl., 23.1.29. Renewed 14.1.32).

Treating [converting] petroleum oil. C. F. Tears, Assr. to Universal Oil Products Co. (U.S.P. 1,884,915, 25.10.32. Appl., 18.6.23. Renewed 23.2.29).

Production of motor fuel from residual oils. S. Swartz, Assr. to Jenkins Petroleum Process Co. (U.S.P. 1,885,387, 1.11.32. Appl., 28.5.28).

Apparatus for cracking hydrocarbon oils. A. E. Harnsberger and C. L. Smith, Assrs. to Gyro Process Co. (U.S.P. 1,889,199, 29.11.32. Appl., 30.10.29).

[Oil-]cracking still and process. W. L. Bagwill (U.S.P. 1,886,621, 8.11.32. Appl., 9.5.28).

Treatment [cracking] of hydrocarbons. J. D. Seguy, Assr. to Universal Oil Products Co. (U.S.P. 1,888,051, 15.11.32. Appl., 26.10.23. Renewed 8.7.29).

Hydrocarbon [cracking] treatment. H. T. Darlington, Assr. to Oil Corp. of America (U.S.P. 1,884,586, 25.10.32. Appl., 25.4.27).

Cracking of hydrocarbons. E. C. Herthel and H. L. Pelzer, Assrs. to Gray Processes Corp. (U.S.P. 1,887,128, 8.11.32. Appl., 14.9.28).

Cracking and gasifying hydrocarbons. J. H. Anderson (U.S.P. 1,887,112, 8.11.32. Appl., 6.12.28).

Treatment [cracking] of petroleum oil. G. Egloff and H. P. Benner, Assrs. to Universal Oil Products Co. (U.S.P. 1,888,029, 15.11.32. Appl., 17.7.24. Renewed 14.8.30).

Liquid-phase reactions. Org. catalysis. Separation of liquids. Filtering [tar, oils, etc.]. Heat-treating liquids. Const.-temp. distillation.—See I. **Oxidation of liquid hydrocarbons. Removing C_5H_5N etc. from phenols.**—See III. **Lubricants.**—See V. **NH_3 from petroleum-refinery by-products.** See VII. **Cement concretes.**—See IX. **Volumetric meters.**—See XI. **Compounding rubber [with tar oils].**—See XIV.

III.—ORGANIC INTERMEDIATES.

Utilisation of methane. T. S. Wheeler (J. Indian Chem. Soc., 1933, Spec. no., 53—60).—Possible methods are reviewed. H. B.

Influence of the nature of the catalyst on the purity of methyl alcohol synthesised from water-gas. M. Strada (Giorn. Chim. Ind. Appl., 1933, **15**, 168—176; cf. B., 1933, 259).—The catalysts tested consisted of ZnO, either alone or mixed with Cr_2O_3, Al_2O_3, MgO, MnO, $Cr_2O_3 + FeO$ (or Fe_2O_3), $Cr_2O_3 + MgO$, or of natural smithsonite calcined at a low temp. As regards both yield and purity of the resulting MeOH, the last proved best. T. H. P.

Catalytic reduction of aromatic nitro-compounds. S. J. Green (J.S.C.I., 1933, **52**, 172—173 T; cf. B., 1933, 260).—Aromatic NO_2-compounds are slowly reduced to amines when active catalytic Ni is suspended in the liquid NO_2-compound, which is heated to 180°, and H_2 at atm. pressure passed in. This action is strongly augmented by a mixture of high-boiling, saturated paraffin hydrocarbons; other substances, such as $Et_2C_2O_4$, Me cinnamate, and tetrahydronaphthalene, which do not possess a long C chain are either much less effective, or inert. This promoting action appears to be associated with a finer dispersion of the Ni catalyst, brought about when the long-C-chain compound is present.

Industrial preparation of phenacetin and guaiacol. M. Gallotti (L'Ind. Chimica, 1933, 8, 428—432).—A summary, with plant diagrams and bibliography, of the processes of making these products from PhCl. T. H. P.

Reduction of tar phenols. MeOH as fuel. Solubility of EtOH in gasoline. Liquid hydrocarbons from C_2H_2.—See II. **Dyes from phenanthraquinone.**—See IV. **Indicators for steel analysis.**—See X. **Determining βγ-butylene glycol.**—See XVIII. **Amyl alcohol for milk-testing.**—See XIX. **Determining nitroglycerol and dinitrotoluene in admixture.**—See XXII.

Patents.

Oxidation of liquid hydrocarbons. M. Luther and H. Klein (U.S.P. 1,864,079, 21.6.32. Appl., 1.8.30. Ger., 6.8.29).—When hydrocarbons with b.p. $<$ 180°, *e.g.*, C_6H_{14} or a petroleum fraction, are oxidised in the liquid phase by O_2, air, etc. at 80—200°/$<$ 50 atm., with or without a catalyst, *e.g.*, Al, glass, or the resinates, oleates, etc. of an alkali or alkaline-earth metal or of Mg, Al, or Mn, the addition of 2—20% of a saturated carboxylic acid below C_5, *e.g.*, AcOH, or the acid anhydride favours the production of esters. D. K. M.

Catalysts [for manufacture of acetic anhydride]. A. Dierichs, Assr. to I. G. Farbenind. A.-G. (U.S.P. 1,870,357, 9.8.32. Appl., 23.12.30. Ger., 28.1.29).—The catalysts comprise B phosphate and, *e.g.*, a mixture of $NaPO_3$ and $LiPO_3$, or NaOH and LiOH, or $Na_2B_4O_7$. L. A. C.

Catalysts for preparation of esters. J. Martin and I. J. Krchma, Assrs. to Commercial Solvents Corp. (U.S.P. 1,869,761—2, 2.8.32. Appl., 14.5.31).—Material is claimed comprising Ag or a Ag compound, a uranyl compound of Ca, Ba, Sr, Mg, Zn, Ag, or Pb [*e.g.*, $Ba_2UO_2(CO_3)_3$], and a hydroxide of Al, Th, Zn, or Be, with the addition, in (b), of Cu, Ni, Fe, or Co, or a compound thereof. L. A. C.

Polymerisation of esters of olefinedicarboxylic acids. E. I. Du Pont de Nemours & Co., and H. B. Dykstra (B.P. 389,467, 8.9.31).—Maleic, fumaric, and other olefinedicarboxylic esters of monohydric alcohols are polymerised by heat and/or actinic light in presence or absence of Bz_2O_2, $PbEt_3{\cdot}OAc$, or other catalyst. Et fumarate gives a resin useful in coating compositions. C. H.

Manufacture of (a) reduction compounds of non-benzenoid acetylene polymerides, (b) emulsions of vinylacetylenes or their polymerides or reduction products, and of synthetic rubber therefrom, (c) halogenated, unsaturated, non-benzenoid acetylene polymerides or their reduction products. W. W. Triggs. From E. I. Du Pont de Nemours & Co. (B.P. [a, b] 389,108—9, [c] 389,122, [a, b] 30.5.31, [c] 4.6.31. Cf. B.P. 384,654—5; B., 1933, 182).—(a) The oily initial polymeride of the prior patents is hydrogenated to give mixtures of C_6H_{14}, hexadiene, hexatriene, $CEt\vdots C{\cdot}CH\vdots CH_2$, and $CEt\vdots CEt$ from the trimeride, or compounds in C_8 from the tetrameride. A suitable degree of hydrogenation gives products useful as coating compositions. Reduction may be followed by a further polymerisation, with or without addition of other polymerisable compounds, yielding paint and varnish vehicles. (b) Emulsions of mono- and di-vinylacetylenes, their liquid or gaseous polymerides and partial reduction products are prepared with the help of the usual agents. An emulsion in which the particles are about 1 μ diam. and containing a suitable resin, *e.g.*, that extracted by $COMe_2$ from *Hevea* or guayule rubber, resembles latex and on coagulation yields a synthetic rubber. (c) Halogen is introduced by addition at the unsaturated linkings in mono- and di-vinylacetylenes, and their polymerides and partial reduction products. Amongst the substances obtained are: αβγδεζ-hexachloro-Δ^{γ}-hexene, b.p. 145—150°/12 mm.; γδ-dichloro-$\Delta^{\alpha\gamma\epsilon}$-hexatriene, b.p. 58°/7 mm.; αβ-dichloro-$\Delta^{\alpha\gamma}$-butadiene or γδ-dichlorobutinene, b.p. $>$ 100°. By the use of S_2Cl_2 vulcanised halogen derivatives are obtained which are applied in moulding powders, as adhesives, and in acid-proof coating compositions. C. H.

Manufacture of assistants for the textile and allied industries. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 389,543, 28.9.31).—Wetting agents (etc.) of the type $R{\cdot}CO{\cdot}NHR'$, $R{\cdot}CO{\cdot}NR'R''$, or $R{\cdot}CO{\cdot}OR'$, in which R' and R'' = alkyl, alicyclyl, aryl, or aralkyl, $R{\cdot}CO$ = acyl above C_9, and R' carries a sulphonic or sulphato-group, are halogenated in the acyl group, preferably 2—4 halogen atoms being introduced. The products may also be synthesised from suitable halogenated acids. Halogenation is preferably effected in $C_2H_4Cl_2$ or CCl_4. C. H.

Removal of pyridine or other nitrogenous bases from phenols. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 389,517, 11.9.31).—Mineral or non-volatile org. acid, preferably equiv. to the bases present, is added and free phenols are distilled off in vac. Suitable acids are 60% H_2SO_4, $PhSO_3H$, H_3PO_4. C. H.

Production of *o*-aminoaryl mercaptans [*o*-aminothiophenols] and derivatives thereof. E. I. Du Pont de Nemours & Co. (B.P. 389,511, 17.9.31. U.S., 17.9.30).—2-Aminoarylthiazoles (*e.g.*, 2-amino-6-ethoxy- and 2-amino-4-methyl-benzthiazoles) are hydrolysed to *o*-aminothiophenols with dil. aq. caustic alkali under pressure. C. H.

Manufacture of intermediates and dyes of the anthraquinone series. J. Y. Johnson. From I. G. Farbenind. A.-G. (B.P. 389,568, 25.11.31).—A 2-succinimido- or 2-phthalimido-anthraquinone carrying in position 1 halogen or a diazo group is condensed in presence of Cu or Cu_2Cl_2. The products may be hydrolysed with aq. alkali and an org. diluent (alcohols) below 80° to give carboxyacylamino-compounds, or with $C_2H_4(NH_2)_2$ or N_2H_4 in H_2O-miscible org. solvents below 50° to give aminoanthraquinones, or may be hydrolysed and condensed in one operation with H_2SO_4 ($<$ 90%) to give flavanthrones. Examples include products from 1-chloro-2-succinimido-, -2-phthalimido-, -2-ββ-naphthalenedicarboxylimido-anthraquinones, and 1-chloro-2-phthalimido-3-methyl- and 1 : 3-dibromo-2-phthalimido-anthraquinones. C. H.

Catalysis. Separating liquid mixtures. Counter-current extraction [of AcOH].—See I.

Phosphoric esters of tar acids. Pyrolysis, oxidation, etc. of hydrocarbons.—See II. **Acid-proofed metal.**—See X. **Synthetic drying oils.**—See XII. **EtOAc etc. by fermentation. Fatty acids from cellulosic material.**—See XVIII. **Disinfectants.**—See XXIII.

IV.—DYESTUFFS.

Dyes derived from phenanthraquinone. Phenanthraphenanthrazines. N. Ghatak (Reprint, Allahabad Univ. Studies, 1931, 7, 199—208).—The following are prepared by interaction of phenanthraquinone or a derivative with 9 : 10-diaminophenanthrene : *phenanthraphenazine* (*tetrabenzophenazine*), m.p. 211—212° ; 2 : 7-*dinitro*-, m.p. 231—232° (shrinks 210°) ; 2 : 7-*diamino*-, m.p. 177° ; 2 : 7-*dibromo*-, m.p. 239—240° ; 2-*nitro*- ; 4 : 5-*dinitro*-, m.p. 197° ; and 4 : 5-*diamino*-, m.p. 182°, derivatives. 4 : 5-Dinitrophenanthraquinone has m.p. 227° (lit. 215—217°). All are H_2O-insol. coloured substances with poor affinity (from aq. suspension) for silk and wool, which they dye to dull and poorly developed shades. H. A. P.

Use of stannous chloride in evaluation of dye mixtures. J. A. Kime (Ind. Eng. Chem. [Anal.], 1933, **5**, 151—152).—Mixtures of azo and $CHPh_3$ food dyes can be determined satisfactorily by titrating with $SnCl_2$ and $TiCl_3$ successively. The reducing action of $SnCl_2$ is selective and the Sn^{IV} formed does not react with Ti^{II} in the subsequent titration of the second dye. E. S. H.

Sensitisers for the infra-red.—See XXI.

Patents.

Manufacture of sulphurised dyes and their application. Soc. Chem. Ind. in Basle (B.P. 389,555, 26.10.31. Switz., 24.10.30).—Greenish-blue dyes from the indophenol from carbazole and *p*-nitrosophenol giving clear vats are obtained by a bake thionation process in presence of the usual nitrogenous materials (di-*o*-tolylurea, urea), in which the S is provided *in situ* by decomp. of an alkali polysulphide. C. H.

Manufacture of [azo] dyes [for acetate silk etc.]. Soc. Chem. Ind. in Basle (B.P. 389,758, 7.10.32. Switz., 12.10.31).—Diazotised *o*-chloro-*p*-nitroaniline is coupled with an anilinomethane-ω-sulphonic acid free from nuclear SO_3H and *m*-substituents, and the ω-SO_3H is hydrolysed off. The products dye acetate silk etc. in orange shades. C. H.

Anthraquinone dyes.—See III.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Natural substances of high mol. wt. K. Funke (Protoplasma, 1933, **18**, 299—309).—A discussion of the structure of cellulose fibres. A. G. P.

Histological structure of cotton fibres. R. Haller (Helv. Chim. Acta, 1933, **16**, 383—392 ; cf. A., 1931, 828).—Cotton fibres, swollen to any required extent by a solution of $Cu(OH)_2$ in 10% aq. $C_2H_4(NH_2)_2$, have been examined microscopically at various stages of attack. Subsequent staining with methylene-blue differentiates clearly between the cuticle and the underlying cell wall, which are chemically distinct. The cuticle becomes loosened on attack by the swelling agent, and afterwards forms ribbon-like strips which finally shrink to narrow bands constricting the fibre at intervals and giving an illusory appearance of discs (cf. B., 1930, 455). No secondary lamella was observed. F. L. U.

Chemical delinting of cottonseed and industrial utilisation of the lint. B. T. Ardashev (Ind. Eng. Chem., 1933, **25**, 575—581).—Cottonseeds may be delinted by treatment with gaseous HCl for 15—30 min. at 20° or for 7 min. at 40—60°, and subsequent brushing ; germination is not affected. The lint-cellulose is considerably degraded, but may be used for cellulose nitrate lacquers or for hydrolysis and fermentation to EtOH. A. G.

Methionine in wool. J. Barritt (Nature, 1933, **131**, 689—690).—A discussion. L. S. T.

Re-nitration and fractionation of cellulose nitrates. E. Berl and O. Hefter (Cellulosechem., 1933, **14**, 65—77).—The nitration of cellulose is a reversible esterification. When cellulose nitrate is treated with mixed acids containing H_2O (*e.g.*, 17%) it is denitrated until the % N becomes the same as that of cellulose nitrated with this acid. With more H_2O (*e.g.*, 25%) the action is very slow and side-reactions occur. For solutions of renitrated cellulose nitrates in $COMe_2$ the relation between $1/T$ and $\log 1/\eta$ is linear. By successive partial dissolution in EtOH, Et_2O + EtOH (60/40), and $COMe_2$ renitrated nitrates are divided into fractions of different N contents, but these N contents do not correspond with di- or tri-nitrates. Cellulose obtained by hydrolysis of the nitrate gives the *X*-ray diagram of mercerised cellulose. A. G.

Determination of specific gravity. I. Specific gravity of acetate silk. P. M. Heertjes, W. Coltof, and H. I. Waterman (Rec. trav. chim., 1933, **52**, 305—320).—The sp. gr. of acetate silk has been investigated by using the principle of the const.-vol. gas thermometer. The displacement gases used were air, H_2, and He, at 20°, 40°, 50°, and 60°. With air the apparent sp. gr. decreases rapidly with rise of temp., with H_2 less rapidly, whilst He gives the smallest vals., which are independent of temp. The conclusions reached are that air is strongly and H_2 less strongly absorbed by acetate silk, and that He is not absorbed and gives correct results at room temp. F. L. U.

Chromium–nickel–iron castings from sulphite [pulp] service. G. L. Cox and F. L. LaQue (Paper Trade J., 1933, **96** ; T.A.P.P.I. Sect., 222—228).—All except one of the castings examined had failed in service ; this is attributed to the deficiency of Cr in relation to C in the alloy. It is suggested that proper heat-treatment would improve the resistance to attack by sulphite liquor, by limiting intergranular corrosion. H. A. H.

Penetration in alkaline pulping. H. R. Murdock (Paper Trade J., 1933, **96** ; T.A.P.P.I. Sect., 248—250).—A no. of factors affecting penetration of the wood chips during digestion are considered, viz., species of wood, size and moisture content of the chips, temp., pressure, and time in the digester. H. A. H.

Relative stabilities of bleached rag half-stocks and bleached purified sulphite pulps to degradation by calcium hypochlorite solutions. H. F. LEWIS (Paper Trade J., 1933, **96**; T.A.P.P.I. Sect., 239—244).—The author's previous conclusion (B., 1933, 56) is confirmed. The degree of degradation at 25°, 37·5°, and 50° was followed by cuprammonium viscosity, Cu no., and α-, β-, and γ-cellulose determinations. A fundamental difference between rag and wood pulps is inferred. H. A. H.

Effect of pebble-weight variation in the strength testing of wood pulp. F. C. PETERSON and J. KOLESINSKAS (Paper Trade J., 1933, **96**; T.A.P.P.I. Sect., 246—248).—Development of bursting strength is less rapid, whilst tearing strength and freeness are reduced, when the pebble charge in the Abbé porcelain ball mill is increased. H. A. H.

Fibre-strength aspects of newsprint manufacture. G. D. O. JONES, T. W. ROSS, and H. W. JOHNSTON (Pulp and Paper Canada, 1933, **34**, 331—336).—Mechanical pulp (*A*) (3 samples) and unbleached sulphite pulp (*B*) (1 sample), all of newsprint grade, have been fractionated by the screen analysis method (B., 1933, 502) and the sheet properties of the various fractions studied. Density (*d*) varies inversely as the fourth root of relative fibre length (*L*) in the case of *A*, but for *B* the effect of *L* is much less marked. Tearing strength varies directly with *L*, and tensile strength with $1/L^{-2}$. The conclusions of Doughty (B., 1932, 718, 1074), relating solid fraction and *L*, are confirmed, but differentiation is made between the effect of *d* as modified by pressure and that of *L* at const. *d*. Tearing strength is considered to be a measure of the ability of coarser fractions to utilise the cementing power of finer fractions. Air transmission varies directly with *L* and inversely as d^3. The tensile strength of mixtures of *A* and *B* is lower than that of either of the pure pulps; tearing strength, on the other hand, increases steadily from *A* to *B*, whilst air transmission also varies linearly. It is suggested that it may be possible to synthesise *A*-type pulps so that they possess the required % of various fractions, thus eliminating the necessity of using *B* in newsprint manufacture, with its comparative costliness and its faults of causing two-sidedness and lack of opacity in the finished sheet. H. A. H.

Drying of paper and cellulosic papermaking materials. F. A. SIMMONDS (Paper Trade J., 1933, **96**; T.A.P.P.I. Sect., 251—255).—Mainly a survey. The moisture determination of pulpwood, pulp, stuff, and paper may be carried out at 105° for 4 hr. without causing appreciable chemical change, unless volatile matter is present; air circulation is advocated. In preparing samples for general analysis a temp. of 70° is sufficiently high. For drying test-sheets, a temp. of 65° and R.H. 45% are suggested. H. A. H.

Chemical paper-testing methods. P. F. WEHMER (Paper Trade J., 1933, **96**; T.A.P.P.I. Sect., 250).—A comparison of the T.A.P.P.I. standard method (I) of determining traces of reducible S in paper with that of Scheier and Sweet (II) (A., 1932, 241) shows that slightly better agreement is obtained by (I), but (II) gives higher results. It is suggested that (I) might be improved by substituting Al foil for Zn. Modifications to the T.A.P.P.I. method of determining resin in paper are discussed. The electrometric method of Clarke and Wooten (B., 1931, 241) for measuring total acidity is considered satisfactory for uncoated papers. H. A. H.

Photo-electric opacity tester [for paper]. M. N. DAVIS (Paper Trade J., 1933, **96**; T.A.P.P.I. Sect., 236—238).—The various instruments at present in use are criticised, and a new type, simple to operate, is described. A plea is entered for the adoption of contrast ratio as a measure of opacity. H. A. H.

Testing the blood-resistance of butchers' wrapping paper. C. E. LIBBY and L. PARKINSON (Paper Trade J., 1933, **96**; T.A.P.P.I. Sect., 229—232).—Results obtained from the application of T.A.P.P.I. standard size-testing methods to the determination of the blood-resistance of butchers' paper bear no relationship to the actual ability of such paper to inhibit blood penetration. Satisfactory correlation can be achieved, however, by the application of blood-serum in an Abrams penescope, using bromocresol-purple as indicator. H. A. H.

Nitrocellulose.—See XXII.

PATENTS.

Esterification of cellulose. J. F. HASKINS, Assr. to DU PONT RAYON CO. (U.S.P. 1,866,532, 12.7.32. Appl., 25.4.30).—Cellulose is heated in C_5H_5N with an acid anhydride (I), *e.g.*, Ac_2O, in presence of pyridine sulphate (II). The product consists of an org. ester of cellulose, cellulose sulphate, or a mixture of these, depending on the relative proportions of (I) and (II) used. F. R. E.

Esterification of cellulose. C. S. WEBBER and C. J. STAUD, Assrs. to EASTMAN KODAK CO. (U.S.P. 1,866,686, 12.7.32. Appl., 26.9.29).—Cellulose is acetylated, in presence of a non-solvent (CCl_4) if desired, using as catalysts SO_2 and an oxide of N; by varying the relative proportions of these catalysts, acetates of different viscosities and solubility characteristics are obtained. F. R. E.

Precipitation of cellulose esters. KODAK, LTD., Assees. of C. J. MALM and C. R. FORDYCE (B.P. 391,656, 28.7.32. U.S., 28.7.31).—The ester is pptd. from solution in the desired form by treatment with an ether of a higher alcohol, *e.g.*, $Pr^{\beta}{}_2O$. F. R. E.

Manufacture of cellulose acetate. H. LE B. GRAY and C. J. STAUD, Assrs. to EASTMAN KODAK CO. (U.S.P. 1,866,971, 12.7.32. Appl., 22.12.28).—Cellulose is treated with Ac_2O, a catalyst, and insufficient AcOH to dissolve the cellulose acetate formed; $C_2H_4Cl_2$ is then added to complete dissolution of the ester, which is pptd. in H_2O above 84°, the $C_2H_4Cl_2$ being recovered from the evolved vapours. F. R. E.

Cellulose acetate compositions containing mixed volatile solvents. S. J. CARROLL, Assr. to EASTMAN KODAK CO. (U.S.P. 1,866,964, 12.7.32. Appl., 23.4.27).—Cellulose acetate, together with a plasticiser (preferably mixed mono- and tri-acetin), is dissolved in a mixture of MeOAc 50, EtOAc 10—40, and $COMe_2$

40—10 pts., the solvent power of which is $>$ that of any one of the constituents. F. R. E.

Textile oil. A. M. Kinney, Assr. to Standard Oil Co. (U.S.P. 1,871,889, 16.8.32. Appl., 3.1.27).—A lubricant for rayon comprises low-viscosity lubricating oil (*A*) 50—90, oleic acid (*B*) 1—15, and alkali-metal soaps of sulphonic acid produced from mineral oil (*C*) 1—50. *E.g.*, *A* 82, *B* 3, *C* 5, and lard oil 10%. B. M. V.

Lubricant containing cellulose acetate. C. J. Staud and J. T. Fuess, Assrs. to Eastman Kodak Co. (U.S.P. 1,866,732, 12.7.32. Appl., 24.12.30).—$COMe_2$-sol. cellulose acetate (100 pts.) is dissolved in a mixture (approx. 1 : 1) of Et phthalate and Et lactate (200 pts.). H. S. G.

Manufacture of cellulose derivatives [ethers]. Brit. Celanese, Ltd. (B.P. 391,171, 7.10.31. U.S., 15.10.30).—Cellulosic material (cotton linters) is etherified with an ester of an unsaturated alcohol (C_4 or higher, *e.g.*, crotyl halide) in presence of solid NaOH; the product is polymerised by exposure to ultra-violet light. F. R. E.

Manufacture of ether derivatives of carbohydrates, particularly cellulose. C. F. Burgess Laboratories, Inc., Assees. of A. W. Schorger (B.P. 389,534, 14.8.31. U.S., 14.8.30).—Carbohydrate hydroxyalkyl ethers, *e.g.*, cellulose β-hydroxyethyl ether containing $<$ 1 alkyl group per cellulose-C_6 unit, which are incompletely sol. in caustic alkali solutions above 0°, are mixed with aq. caustic alkali (2—6%) and cooled to about —20° until crystals form. The crystals give a clear solution when melted in 4—6% aq. NaOH. To obtain solutions of suitable concn. for film or thread production about ⅓ of the etherified cellulose is removed, neutralised, washed, and returned to the ⅔, the whole being then diluted to 4·75% NaOH and cooled as above. Examples are ethers from cellulose and ethylene oxide (with or without benzoylation), propylene oxide, ethylene chlorohydrin, and glycerol α-chlorohydrin. C. H.

Method of feeding the coagulating liquid while spinning artificial silk. E. Wurtz (B.P. 391,592, 2.4.32).—Each of the spinning nozzles in a common coagulating vat is supplied with fresh, upwardly flowing coagulating liquid previously brought to the same temp. as the liquid already present. F. R. E.

Manufacture of artificial [cellulosic] filaments and like products. H. Dreyfus (B.P. 391,178—9, 19.10.31).—Materials composed of org. derivatives of cellulose are treated with an ester or an ether-ester of a glycol in (A) H_2O, or (B) an org. diluent, *e.g.*, an aromatic hydrocarbon, together with other solvents or swelling agents if desired, and are then stretched. F. R. E.

Manufacture and treatment of artificial materials [containing cellulose esters or ethers]. Brit. Celanese, Ltd., and W. A. Dickie (B.P. 391,158, 19.10.31).—Materials containing org. derivatives of cellulose in the fully set condition, after treatment with a mixture of a solvent or swelling agent (diacetone alcohol, Et lactate), a non-solvent (H_2O), and a substance which reduces the solubility of the solvent in the non-solvent (NaCl, sugar, etc.), are stretched, washed, and dried. F. R. E.

Manufacture of radioactive artificial fibres. F. Fattinger, O. Haas, and Treibacher Chem. Werke A.-G. (B.P. 392,377, 4.7.32).—Up to 0·2% of a finely-dispersed radioactive substance, *e.g.*, $RaSO_4$, is added to the spinning solution from which the fibres are made. A. J. H.

[Solvent-removal] treatment and manufacture of artificial yarns, threads, filaments, etc. Brit. Celanese, Ltd., and W. I. Taylor (B.P. 391,863, 7.11.31).—Materials composed of cellulose esters or ethers are treated continuously, or immediately after their production, with dry steam. F. R. E.

Manufacture and treatment of [cellulose ester or ether] artificial silk etc. H. Dreyfus (B.P. 391,480, 21.10.31).—The effect of a swelling agent (*A*), when present in cellulose acetate etc. silk, in the form of an emulsion with a non-solvent (*B*), is much increased by immersing the silk in a solution of a substance capable of decreasing the solubility of *A* in *B*; this is utilised in the processes described in B.P. 177,868, 277,089, and 340,437 (B., 1922, 459A; 1927, 964; 1931, 1043). A. J. H.

Forming artificial silk etc. having a matt appearance. J. J. Stoeckly and E. Witte (U.S.P. 1,867,188, 12.7.32. Appl., 25.4.30. Ger., 17.4.29).—Up to 1·5% of emulsified fats, talcs, waxes, etc. is incorporated in the spinning solution so that the resulting silk filaments have an irregular surface. A. J. H.

Treatment of (A) yarn [for even shrinkage], (B) artificial filaments [for even elongation and strength]. J. L. Bitter and R. Elssner, Assrs. to Amer. Glanzstoff Corp. (U.S.P. 1,867,609—10, 19.7.32. Appl., [A] 2.7.31; [B] 29.8.31).—(A) Artificial filaments wound on a perforated bobbin are covered on the outside with an impermeable covering, and dried from the inside only; they are then rewound on another similar bobbin and the process is repeated. (B) Freshly-spun filaments, subsequent to the usual after-treatment processes on spools, are dried at approx. 70°, conditioned, twisted on to other spools, rewetted, and redried at approx. 70° in 2—8 hr. F. R. E.

(A) **Evenness of shrinkage.** (B) **Drying process.** (C) **Drying of artificial filaments.** R. Elssner, Assr. to Amer. Glanzstoff Corp. (U.S.P. 1,867,617—9, 19.7.32. Appl., [A] 29.8.31, [B] 11.9.31, [C] 26.2.32).—After winding on spools or bobbins, the filaments are wet-treated and (A) dried, rewetted, redried, rewound, and twisted on to other similar spools or bobbins, and the wetting and redrying steps are repeated several times; (B) dried slowly at 20—30° and humidity approx. 80%, loosely twisted on to other spools, rewetted, and redried slowly; (C) dried slowly until the moisture content is approx. 80%, rewound on to twisting spools, and the drying is completed. F. R. E.

Treatment of films and foils of cellulose esters. I. G. Farbenind. A.-G. (B.P. 391,669, 12.9.32. Ger., 5.10.31).—The film etc. containing the usual softening agents (*A*) is saponified on one or both sides to a depth of at least ⅙th of its thickness by an alkaline liquid sol., at least partly, in *A* (10% NaOH in 1 : 1 aq. MeOH), and is then washed free from alkali by a liquid having no solvent action on *A* (*e.g.*, 3% AcOH followed by aq.

MeOH). The treated films have improved mechanical properties and a low sensitiveness to H_2O, and are suitable for use as photographic supports. F. R. E.

Production of [delustred] artificial filaments, threads, films, etc., and fabrics and other articles containing the same. Brit. Celanese, Ltd. (B.P. 391,876, 11.11.31. U.S., 18.11.30).—Finely-divided H_2TiO_3 (0·1—10 wt.-% of the org. cellulose derivative) is incorporated in the spinning solution before extrusion. F. R. E.

(a) **Delustred regenerated cellulose [filaments].** (b) **Regenerated cellulose films and sheets [of high water-resistance and electrical insulation].** (c) **Manufacture [of strengthened] cellulosic materials.** H. A. Gardner (U.S.P. 1,864,426—8, 21.6.32. Appl., [a] 25.10.29, [b] 25.3.30, [c] 24.10.30).—Viscose is treated with an alkaline solution of (a) about 5%, (b) 5—20%, calc. on the wt. of cellulose, of a toluenesulphonamide–CH_2O (or similar) resin (I) before extrusion into the coagulating bath, when the resin is pptd. as a fine haze in the cellulose. In (b) the films etc. may be rendered transparent, after washing and drying, by passing through heated rollers to fuse the resin. (c) Before extrusion, the cellulosic solution (preferably of cellulose esters or ethers) is mixed with a solid, insol. aldehyde polymeride (paraformaldehyde, trioxymethylene), (I), and an inorg. pigment. F. R. E.

Production of moisture-resistant cellulose products. J. Kantorowicz (B.P. 391,153, 8.9.31. Ger., 20.9.30).—A crude cellulose, after wet-proofing by a parchmentising process, *e.g.*, by treatment with H_2SO_4 or $ZnCl_2$, or with CH_2O and dil. HNO_3, or with acid salts and heat, is mixed with a suitable proportion of non- or slightly wet-proof cellulose; the mixture is worked up in the usual way into paper, board, etc. F. R. E.

Diminishing the permeability to water vapour of non-metallic foils or sheets. Wolff & Co. Komm. Ges. auf Akt., and R. Weingand (B.P. 391,334, 28.6.32. Ger., 29.12.31).—The sheets etc. are coated with a thin layer composed of a hot molten mixture of a cellulose derivative (nitro- or acetyl-cellulose) with a larger proportion of a resin (colophony, gum dammar), with addition of waxes or greases and a small proportion of a plasticiser (Ph_3PO_4). The whole is subsequently heated for a short time at the m.p. of the coating. F. R. E.

Waterproofing of sheets of cellulosic material. Courtaulds, Ltd., and F. Shedden (B.P. 391,299, 19.3.32).—The sheets are treated with a solution in a suitable solvent (BuOAc) of nitrocellulose, Me_2 phthalate, a wax (paraffin), and a plasticiser (Ph_3PO_4). F. R. E.

Manufacture of water-proof and insulating paper. J. Knaggs, J. C. Marsden, and Portals, Ltd. (B.P. 391,350, 2.8.32).—A waterleaf cellulose paper is impregnated with an emulsion containing gelatin, together with (*a*) a drying or semi-drying oil, or a mixture of one or both of these with a mineral oil and suitable drier, or (*b*) with a solution of a natural or artificial resin; the impregnated paper is subsequently treated with aq. CH_2O or its polymerides or homologues, or with alum, $Na_2Cr_2O_7$, etc. to render the gelatin insol. F. R. E.

Apparatus for recovering acid and heat units thereof from digesters and for preparing digester liquor. J. Strindlund. Assr. to Chemipulp Process, Inc. (U.S.P. 1,862,243, 7.6.32. Appl., 28.3.27. Swed., 31.3.26. Renewed 15.6.31).—The apparatus consists of a single vessel divided into an upper (*A*) and a lower (*B*) compartment by a slightly coned partition. Hot relief acid and liquor from the digester are introduced into *B*, any excess of gas escaping through a vent in the apex of the cone into *A*, which contains raw acid. When the enriched acid in *B* is drawn off to the digesters, raw acid flows from *A* into *B* through one or more vents placed near the periphery of the partition. D. J. N.

Production of [sulphite] pulp. J. W. Stevens and W. H. Kenety, Assrs. to Chemipulp Process, Inc. (U.S.P. 1,860,755, 31.5.32. Appl., 27.1.28).—During the heating period and the early part of the cook, the relief gas and liquor (relatively uncontaminated at this stage) are fed direct into an accumulator (*A*) containing raw acid. Later, when the back-pressure in *A* tends to interfere with the proper relief of the digester, the relief liquor (now contaminated with by-products from the cook) is used to supply heat to *A* indirectly. D. J. N.

Manufacture of [kraft] wood pulp. O. Kress (U.S.P. 1,867,626, 19.7.32. Appl., 2.4.27).—Wood chips are impregnated under pressure with a hot solution of NaOH and Na_2S, and the cooking is completed after withdrawal of part of the liquor, which is restored to its original composition for re-use by addition of a recovered "white liquid." F. R. E.

Converting liquid paper pulp into a consistent mass suitable for storage etc. or into bales for shipment. R. T. Lang, Assr. to Amer. Voith Contact Co., Inc. (U.S.P. 1,861,184, 31.5.32. Appl., 13.11.29).—The screened stock is dewatered to a pulp consistency of 2—8% and passed through a screw press to give a pulp containing 45—70% of H_2O. This is shredded and transported to the baling machines or storage bins by compressed air. D. J. N.

Liberation of chemical fibre. G. A. Richter, Assr. to Brown Co. (U.S.P. 1,867,593, 19.7.32. Appl., 12.4.29).—Raw cellulosic material is heated under pressure first with alkaline or non-acid Na_2SO_3 solution, and afterwards with NaOH and Na_2S solution to complete the fibre liberation. The combined spent liquors are evaporated and ignited in a reducing atm. to produce Na_2CO_3 and Na_2S; the former is separated by dissolution and crystallisation, and is treated with SO_2 and H_2O to yield a non-acid sulphite liquor for the first operation, whilst the residual alkaline liquor is used for the second operation. F. R. E.

Producing low-viscosity cellulose fibre. G. A. Richter, Assr. to Brown Co. (U.S.P. 1,860,431—2, 31.5.32. Appl., [a] 2.6.28, [b] 22.8.28).—(a) The pulp (rag, sulphite, kraft, etc.) is treated at a consistency of 2—10% with a hot aq. colloidal solution of a metal of the Fe–Co–Ni group (preferably in a weakly alkaline medium) until its viscosity is $<$ 1 (c.g.s. unit). *E.g.*, the pulp is digested at 100° for 2 hr. in 0·25% aq. $Fe_2(NO_3)_6$ containing 0·5—1% of NaOH on the wt. of pulp. The presence of NaOH retards the reaction but gives a product of higher α-cellulose content. Fe pptd. on the fibre is removed by hot 0·2—0·5% aq. $H_2C_2O_4$. (B) A 2—10% suspension of the pulp in aq. NaOH (1% up to mercerising concn.) is agitated with air under pressure (20—100 lb./sq. in.) at $\not>$ 65°. Catalysts, *e.g.*, Fe salts, may be present. When a product of very low viscosity ($<$ 0·1 c.g.s.) and high α-cellulose content is required, this process may be applied to pulp the viscosity of which has already been reduced to $<$ 1 by mercerisation and ageing of the alkali-cellulose. D. J. N.

Manufacture of paper. J. J. O'Connor, Assr. to Mead Corp. (U.S.P. 1,868,291, 19.7.32. Appl., 9.10.29).—Fibrous stock, after beating, is mixed with the filler etc. and formed into a paper web, whilst the liquid and entrained solids, drained and removed from the web during formation, are filtered through a mat formed primarily of the beaten fibrous material unmixed with filler. F. R. E.

Manufacture of [strengthened and delustred] cellulosic material [by extrusion]. H. A. Gardner (B.P. 391,632, 16.6.32).—See U.S.P. 1,864,428; *supra.*

Rubber-dispersing agent.—See XIV.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Bleaching in strongly alkaline peroxide baths. W. Fehre (Arh. Hemiju, 1933, 7, 42—45).—For effective bleaching, the reaction of the bath should, for vegetable fibres, correspond with 3 drops of 0·1*N*-NaOH per c.c. Since the alkalinity often falls during the process, it should be tested at intervals and fresh alkali added when necessary. R. T.

Substantive dyeing of cellulose fibres. P. Ruggli (Kolloid-Z., 1933, **63**, 129—138).—Recent work is discussed. F. L. U.

Chromium-plating in calico-printing. J. B. Dick (Amer. Dyestuff Rep., 1933, 22, 305—310).—Cu printing rollers are made more resistant to corrosion and scratching by plating in a bath containing, per litre, CrO_3'' (400) and H_2SO_4 (8 g.) with a c.d. of 1·3 amp. per sq. in., the resulting Cr plate being 0·0002—0·0004 in. thick. Similar plating of Schreiner rollers was not so successful. A. J. H.

Textile-aid industry.—See XII. **Starches.**—See XVII.

Patents.

Treatment of threads and the like with liquids. H. Dreyfus (B.P. 391,443, 26.10.31).—The yarn etc. is led over freely rotatable rollers fed with a liquid. A. J. H.

[Black] coloration of [cellulose acetate] textile materials. Brit. Celanese, Ltd., G. H. Ellis, H. C. Olpin, and W. B. Miller (B.P. 390,819, 9.10.31. Addn. to B.P. 332,624; B., 1930, 1024).—HCO_2H is used instead of AcOH or other org. acid when the process described in the prior patent is used in printing. A. J. H.

Preparation of thickened solutions for the printing of textile fabrics. W. W. Groves. From Naaml. Venn. W. A. Scholten's Chem. Fabr. (B.P. 392,178, 6.8.31).—Aq. solutions of dyes and/or other chemicals are thickened by the addition of starch or a starch product which is capable of swelling in cold H_2O to form a non-granular paste. A. J. H.

Treating and ageing fabrics. E. S. Chapin and A. H. Jacoby, Assrs. to Deltex Co. (U.S.P. 1,861,624, 7.6.32. Appl., 18.6.30).—Refinements of previously described devices (cf. U.S.P. 1,738,946; B., 1930, 320) are claimed for the purpose of accurately controlling the temp. and H_2O content of the air within, and the fabric passing through, an ager as used in printing. A. J. H.

Treatment [delustring] of materials made of or containing cellulose derivatives. Brit. Celanese, Ltd., R. H. Parkinson, and C. W. Addy (B.P. 391,497, 31.10.31. Addn. to B.P. 343,121; B., 1931, 485).—The delustring suspensions described previously are applied to cellulose acetate etc. silk under alkaline conditions, *e.g.*, in the presence of soaps, NH_3, K_2CO_3, etc., which are insufficient to cause substantial hydrolysis of the silk. A. J. H.

Making effect threads [immunised cotton etc.] heat- and storage-proof. E. Stocker, Assr. to Munitex Corp. (U.S.P. 1,867,035, 12.7.32. Appl., 5.4.28).—The textile material is impregnated with an acid-neutralising substance, *e.g.*, $CO(NH_2)_2$, $CS(NH_2)_2$, or derivatives of these, insufficiently alkaline to cause hydrolysis of the cellulose ester. A. J. H.

Manufacture of [sized] textile material. H. Platt, Assr. to Celanese Corp. of America (U.S.P. 1,861,026, 31.5.32. Appl., 15.11.29).—A size suitable for yarns containing org. derivatives of cellulose contains a colourless drying oil, *e.g.*, bleached linseed oil, and K oleate. Such a size does not stain the yarn and is easily removed by friction or shaking. D. J. N.

Transfer [sheet for ornamentation of fabrics]. H. S. Sadtler (U.S.P. 1,865,215, 28.6.32. Appl., 13.6.27).—A paper sheet is coated in the form of a design with the transferable composition containing some or all of the following: a coagulable material (albumin), a softener (glucose or glycerin), a dye or pigment, a colloidal gum insol. in cold but sol. in hot H_2O (tragacanth), a coagulant, and a reducing agent. F. R. E.

Method and means for mercerising. H. W. Butterworth, jun., Assr. to H. W. Butterworth & Sons Co. (U.S.P. 1,861,490, 7.6.32. Appl., 8.2.29).—In the stenter or expanding roller type of mercerising machine, fabric is padded with aq. NaOH and then led over a no. of slotted pipes connected to a source of vac. before the usual washing and stretching, whereby about 50% of the usual amount of mercerising lye carried forward by the fabric is recovered before dilution. A. J. H.

Assistants for textile industries.—See III. **Application of S dyes.**—See IV. **Radioactive fibres.**—See V.

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

Determination of efficiency of oxidation of ammonia. S. Wein (Przemysł Chem., 1933, 17, 75—80).—Samples of reaction gas are taken at the temp. and pressure at which it leaves the reaction chamber; the no. of g. of NO per 10 litres, calc. from the equation

$4NH_3 + 5O_2 = 4NO + 6H_2O$, is $A = 0{\cdot}2246Vb/T$, and efficiency of oxidation is expressed as $100A'/A$, where V is the vol. of NO in the sample, b and T are the pressure and abs. temp. at which the sample was taken, and A' is the experimentally determined NO content. R. T.

Chemical lime from oölite. E. P. Poste (Ind. Eng. Chem., 1933, 25, 502—504).—A CaO works in Tennessee having both vertical and rotary kilns is described. $Ca(OH)_2$ is made in a Schaffer hydrator—a vertical cylinder fitted with shelves and scrapers—crushed CaO and H_2O being introduced at the top. The $Ca(OH)_2$ is then ground in a Mason's impact machine, the finished product containing 0·5% free H_2O. C. I.

Automatic rotatory apparatus for continuous production of chloride of lime. O. De Nora (Annali Chim. Appl., 1933, 23, 151—158).—The method and plant described (Ital. P. 282,174 and 288,307; G.P. 143,174) are more economical and hygienic to work than is the Pb-chamber method. Gas of any Cl_2 content is usable, no Cl_2 or $CaCl_2$ dust escapes, and the working is not influenced by variation of the outside temp. T. H. P.

Calcium hypochlorite [bleaching powder]. V. Macri (Boll. Chim.-Farm., 1933, 72, 327—328).—Possible sources of error in Tarugi's and Neumann's proofs of the formula, $Ca(OCl)_2$, for bleaching powder are discussed. R. S. C.

Utility and applications of ozone. V. Gambarotta (L'Ind. Chimica, 1933, 8, 433—441).—The properties, occurrence, and modern methods of producing O_3, and its uses in ventilation, potable water treatment, preservation of goods, ozono-therapy, etc. are discussed. T. H. P.

Void content in mineral powders. Absorption of NO_2 in aq. Na_2CO_3.—See I. **Waste products from Al_2O_3 manufacture.**—See IX. **ZnO for rubber.**—See XIV. **PbN_6.**—See XXII. **Determining CO_2 in air.**—See XXIII.

Patents.

Manufacture of hydrobromic acid. A. S. Behrman (U.S.P. 1,870,308, 9.8.32. Appl., 15.6.31).—The acid is produced by the interaction below 100° of active C, H_2O, and Br vapour: $C + 2Br_2 + 2H_2O = 4HBr + CO_2$, preferably by passing air saturated with Br vapour up through layers of C irrigated with H_2O. L. A. C.

Manufacture of sodium hydroxide. P. Krassa (B.P. 391,462, 28.10.31. Austr., 4.11.30).—A mixture of Fe_2O_3 (preferably limonite) and $NaNO_3$ is heated at 600—750° in the presence of amorphous SiO_2 "having a great surface development"; the process is effected, *e.g.*, in presence of steam and/or other gas in quantity such that the N oxide concn. is $>$ 2%. The $NaFeO_2$ formed is decomposed by H_2O under pressure at $>$ 100°. L. A. C.

Separation of caustic soda and sodium chloride. A. K. Smith, Assr. to Dow Chem. Co. (U.S.P. 1,865,281, 28.6.32. Appl., 2.6.28).—The solution is evaporated until it contains 51% NaOH, cooled to 15°, filtered to remove NaCl crystals, conc. to 69% NaOH, and cooled to 64° to allow $NaOH,H_2O$ crystals to separate. The crystals are washed with the liquor obtained by melting crystals from an earlier crop. A. R. P.

Recovery of sodium carbonate from brine [containing sodium sulphate]. L. Rosenstein and K. G. Bell, Assrs. to Pacific Alkali Co. (U.S.P. 1,869,621, 2.8.32. Appl., 26.7.30).—A mixture of $Na_2CO_3,10H_2O$ and $Na_2SO_4,10H_2O$ crystals obtained, *e.g.*, by cooling to about 5° brine from Owens Lake, California, is heated until the salts have dissolved in the H_2O of crystallisation and a large proportion of the H_2O has evaporated; the solution is then cooled to (preferably by the addition of more decahydrate) and maintained at a temp. such that $Na_2CO_3,7H_2O$ crystallises, and the crystals are removed. L. A. C.

Manufacture of synthetic ammonia from petroleum-refinery by-products. C. Ellis, Assr. to Ellis-Foster Co. (U.S.P. 1,864,717, 28.6.32. Appl., 15.12.21. Renewed 17.7.28).—A mixture of air and steam is passed through the oil at 400—500° under 250 lb./sq. in. to produce a gas mixture rich in N_2 and at the same time to crack the oil. H_2 is made by passing the saturated hydrocarbon gases from the cracking plant together with steam over a Ni catalyst at 900° and suitably absorbing the CO_2 and CO formed with the H_2. The H_2 and N_2 are mixed in correct proportions and converted into NH_3 in the usual way. A. R. P.

Preparation of high plastic lime. M. Y. Seaton, Assr. to California Chem. Corp. (U.S.P. 1,872,512, 16.8.32. Appl., 24.6.30).—CaO, very plastic although free from Mg and Si, may be made by burning $CaCO_3$ substantially free from SiO_2 at $>$ 1200°, preferably 1400—1700°. B. M. V.

Production of hydrated lime. C. W. Keller, Assr. to Amer. Lime & Stone Co. (U.S.P. 1,871,530, 16.8.32. Appl., 3.4.31).—CaO is slaked in two stages, $\not>$ 45% of its own wt. of H_2O (preferably about 24%) being added at the first stage and the remainder after cooling. B. M. V.

Preparation of [granular] soda-lime. C. A. Carey, Assr. to Dewey & Almy Chem. Co. (U.S.P. 1,872,026, 16.8.32. Appl., 22.12.30).—Fines and dust (usually considered as waste) from the granulation of soda-lime are tumbled in contact with a misty spray of H_2O and thus become aggregated. The composition may be controlled by the addition of finely-divided CaO or a spray of aq. NaOH. B. M. V.

Making precipitated calcium carbonate. J. W. Church and H. G. Elledge, Assrs. to Pure Calcium Products Co. (U.S.P. 1,872,891, 23.8.32. Appl., 24.12.28).—Pptd. $CaCO_3$ is caused to have about the same oil-absorption val. (25 c.c./100 g.) as whiting by prolonged attrition and is then suitable for use as a filler for plastics. B. M. V.

Separation of salts and liquors. W. H. Allen, F. Macdonald, and W. A. Gale, Assrs. to Amer. Potash & Chem. Corp. (U.S.P. 1,873,251, 23.8.32. Appl., 26.9.28).—In the evaporation of brines containing both NaCl and Na_2CO_3, the two salts are separated by hydraulic classification in their mother-liquors at the temp. of evaporation. The classifier has as many superposed compartments as effects in the evaporator, the most. conc. liquor being at the top. In addition to circulation from and to the effects, liquors for the upward currents are taken from the next compartment below or from the NaCl filter, as the case may be. The NaCl passes through all compartments downwards, being withdrawn only from the lowest to a filter; the Na_2CO_3 and mother-liquor are withdrawn only from the top to another filter, the intermediate overflows going back to their own effects in the evaporator. B. M. V.

Decomposition of crude phosphates. O. Balz and W. Wagner (U.S.P. 1,869,879, 2.8.32. Appl., 24.12.30. Ger., 6.1.30).—The phosphates are treated with H_3PO_4, *d* 1·285—1·41, in the presence of $\nless$ 1 kg. per litre of acid, of an alkali, NH_4, or Mg salt, or a mixture of these, *e.g.*, $(NH_4)_2SO_4$ and/or KCl. The product may be treated with NH_3. L. A. C.

Manufacture of acid phosphate. A. H. Case (U.S.P. 1,870,602, 9.8.32. Appl., 16.1.30).—Crude phosphates, after grinding with excess H_2O, sieving to remove material $>$ 200-mesh, and removing excess H_2O (leaving rock : H_2O = 3 : 1), are treated with H_2SO_4, *d* $>$ 1·82, so that considerable heat is evolved and conversion into sol. phosphate is rapid. L. A. C.

Detergent and water-softening product. W. A. Gale and C. F. Ritchie, Assrs. to Amer. Potash & Chem. Corp. (U.S.P. 1,870,804, 9.8.32. Appl., 6.3.26).—Mixtures of $Na_3PO_4,NaBO_2,18H_2O$ with one or more compounds such as $Na_2B_4O_7$, Na_2CO_3, $NaHCO_3$, $Na_3PO_4,12H_2O$, and soap are claimed. L. A. C.

Making colloidal silica. P. W. Porter and R. E. Needham (U.S.P. 1,872,183, 16.8.32. Appl., 10.11.30).—Laumontite, $CaO,Al_2O_3,4SiO_2,4H_2O$, is treated with cold dil. HCl and the supernatant liquid is set aside until it solidifies. B. M. V.

Catalysts for hydrogenation of organic materials. R. A. A. Taylor (B.P. 391,988, 27.5.32).—SiO_2 gel is impregnated with a Mo compound by shaking it with a non-aq. solution of the compound or by passing the vapour of the compound over the gel. Suitable compounds are $MoCl_5$, $MoOCl_2(OH)_2$, MoO_3, $MoCl_3$, and $MoOCl_3$. The impregnated gel is activated by heating in air and/or steam at 300°. A. R. P.

Preparation of catalysts for hydrogenating and other reactions. E. I. Du Pont de Nemours & Co. (B.P. 392,134, 27.1.33. U.S., 27.1.32).—An inert carrier, *e.g.*, kieselguhr, activated C, Al_2O_3 gel, etc., is suspended in a solution of a metal hydroxide in aq. NH_3 and air is blown through the suspension at 50—80° to remove the NH_3 and ppt. the hydroxide on the carrier. Mixtures of sol. hydroxides insol. in aq. NH_3 may be used, *e.g.*, $Cd(OH)_2$ and $Sn(OH)_2$; or two hydroxides, both of which are sol. in aq. NH_3 but one of which is more readily reduced by H_2, *e.g.*, $Cu(OH)_2$ and $Zn(OH)_2$. The resulting granular product is heated in H_2 to reduce one of the hydroxides present to metal. A. R. P.

Gel-production utilisation. W. Crow and H. Dittlinger, Assrs. to Dittlinger-Crow Process Co. (U.S.P. 1,871,781, 16.8.32. Appl., 15.1.30).—Completely hydrated but dry $Ca(OH)_2$ is caused to react with dry $Al(OAc)_3$ to produce a gel. B. M. V.

Preparation of adsorbent materials. G. C. Connolly, Assr. to Silica Gel Corp. (U.S.P. 1,868,565, 26.7.32. Appl., 22.11.30).—Activated C "fines" ($<$ 300-mesh) are added to, *e.g.*, a SiO_2 or TiO_2 hydrogel (C : oxide $\ngtr$ 1 : 4), and the mixture is washed and dehydrated. L. A. C.

Recovery of cryolite. J. E. Morrow, Assr. to Aluminum Co. of America (U.S.P. 1,871,723, 16.8.32. Appl., 29.5.29).—Almost any form of new or old waste cryolite, or any material containing the same 3 elements, can be recovered by digestion in aq. NaOH (2½% solution at 100°) and subsequent pptn. with acid, *e.g.*, CO_2, at the b.p. B. M. V.

Production of [soluble] barium aluminate. H. W. Heiser, Assr. to Aluminum Co. of America (U.S.P. 1,871,056, 9.8.32. Appl., 20.4.31).—Sol. Ba aluminate, or a mixture of the compound with excess of either BaO or Al_2O_3, is formed from bauxite and barytes, by finely grinding and then mixing the mineral, moistening with an inorg. bond (*e.g.*, 1—2% of NaOH in the form of a 15% aq. solution), briquetting, and heating to $\nless$ 1400°. B. M. V.

Making calcium carbide. A. O. Williams, Assr. to Amer. Cyanamid Co. (U.S.P. 1,872,202, 16.8.32. Appl., 1.9.26).—Fine CaO and coke in whatever proportion they happen to be are utilised by briquetting with H_2O, the deficiency of either being made up in the electric furnace; the power consumption of the latter is not increased by the dampness of the briquettes as they are dried off by the waste heat of the furnace. B. M. V.

Recovery of fluorides from enamel glass smelter gases. G. H. McIntyre, Assr. to Ferro Enameling Co. (U.S.P. 1,869,019, 26.7.32. Appl., 3.5.28).—A finely-divided alkali or alkaline-earth compound, preferably $Ca(OH)_2$, is injected into the hot gas and, after cooling, the gas is passed through filter bags to recover CaF_2 and other solids. L. A. C.

Preparation of partly dehydrated magnesium chloride. S. B. Heath, Assr. to Dow Chem. Co. (U.S.P. 1,871,411, 9.8.32. Appl., 19.3.29).—$MgCl_2$ solution is evaporated at about 140° under vac. until a considerable amount of crystals of $MgCl_2,4H_2O$ have separated out, the slurry is flaked on a cooled roller, and the flakes are dried in hot combustion gases and cooled in a current of air. B. M. V.

Preparation of partly dehydrated magnesium chloride. S. B. Heath, Assr. to Dow Chem. Co. (U.S.P. 1,871,435, 9.8.32. Appl., 15.3.29).—A slurry of $MgCl_2,4H_2O$ crystals and mother-liquor, prepared by the concn. of $MgCl_2$ solution to 170° and subsequent cooling to 140—150°, is flaked and the product is dried and then cooled in a current of air. L. A. C.

Preparation of anhydrous magnesium chloride from magnesium oxychloride cement mixtures. E. O. Barstow, Assr. to Dow Chem. Co. (U.S.P. 1,865,228, 28.6.32. Appl., 6.5.29).—Aq. $MgCl_2$ is treated with MgO and the mixture allowed to set to a solid mass, which is then pulverised, dried, and heated in HCl gas at $>$ 280° (290°). A. R. P.

Manufacture of flake magnesium chloride. A. K. Smith, Assr. to Dow Chem. Co. (U.S.P. 1,871,428, 9.8.32.

Appl., 25.5.28).—Highly hydrated $MgCl_2$ is conc. until the solution has b.p. 180—193°, and the product is solidified as flakes or small particles. L. A. C.

Manufacture of [pure] carbon dioxide. Silica Gel Corp. (B.P. 392,214, 11.11.31. U.S., 13.11.30).—To purify the gas it is compressed (but not liquefied), cooled to separate most of the H_2O, and then passed through a solid porous adsorbent material (*e.g.*, a gel), cooling, if necessary, to prevent the decomp. of any lubricating oil from the compressor. The gas is then re-compressed and filtered through cotton, SiO_2 gel, or activated C. Cooling may be effected by expanding liquid CO_2 into the compressed gas. S. H. M.

Recovery of sulphur [from pyrites]. R. F. Bacon (Assee.) and I. Bencowitz (U.S.P. 1,870,477—9, 9.8.32. Appl., [A] 30.7.30, [B, C] 2.8.30).—(A) Pyritic material is roasted with HCl and minor quantities of H_2O and O_2, the last two being to control the amount of Fe_2O_3 formed and the $H_2S : SO_2$ ratio. Since it is desired to obtain $2H_2S + SO_2$ it is better to have two roasters and mix the gases in correct proportions. The temp. may be 550° at the charging end and 300—400° at discharge. (B) After the above process, the $FeCl_2$ produced is treated with Cl_2 and the $FeCl_3$ hydrolysed to re-form HCl, part of which is treated catalytically with O_2 to form the Cl_2 required and part goes back for use in process (A). In (C), for adjusting process (A), SO_2 and additional pyritic matter are converted into H_2S by roasting in the presence of Mg compounds. B. M. V.

Making colloidal substances [sulphur]. A. Hartzell and F. H. Lathrop, Assrs. to W. C. O'Kane and P. Moore (Crop Protection Inst.) (U.S.P. 1,870,727, 9.8.32. Appl., 16.8.24).—S is volatilised in an outer pot by boiling or by injection of N_2, and the vapours are passed through a small aperture into a solution of fish-oil soap contained in an inner pot. (Cf. U.S.P. 1,705,862; B., 1929, 644.) B. M. V.

Production of volatile fluorides [*e.g.*, boron fluoride]. M. Otto and L. Bub, Assrs. to I. G. Farbenind. A.-G. (U.S.P. 1,865,204, 28.6.32. Appl., 28.2.30. Ger., 6.3.29).—A mixture of a metal fluoride and the oxide of the element the fluoride of which is required is treated with SO_3 or oleum at 200—300°. *E.g.*, B_2O_3 and CaF_2 yield with SO_3, $CaSO_4$ and BF_3. A. R. P.

Production of mono- and di-calcium phosphates. E. I. Du Pont de Nemours & Co. (B.P. 391,495, 30.10.31. U.S., 31.10.30).—See U.S.P. 1,849,703—4; B., 1933, 86.

Heat insulator.—See I. **$H_2 + CO$ from hydrocarbons. Conc. NH_3 liquor.**—See II. **Catalysts for Ac_2O, ester preps., etc.**—See III. **Electron-emission material.**—See XI. **Fertilisers.**—See XVI.

VIII.—GLASS; CERAMICS.

Selenium ruby glass: preparation and *X*-ray study. M. H. Bigelow and A. Silverman (J. Amer. Ceram. Soc., 1933, **16**, 214—219).—The best colour was obtained by adding Se (2·0), CdS (1·0), As_2O_3 (1·0), and C (0·5%) to the basic batch $Na_2O,ZnO,4SiO_2$. The CdS was essential to the production of a ruby colour, which is due primarily to a solid solution of CdS and CdSe. J. A. S.

Mechanics of enamel adherence. VIII. (A) Apparatus for firing enamels under accurate control of temperature, pressure, and atmosphere. (B) Firing enamels under reduced pressures. R. M. King (J. Amer. Ceram. Soc., 1933, **16**, 232—238; cf. B., 1932, 1030).—(A) A small furnace in which the firing schedule can be reproduced to within 7° at the finishing temp. of 700°, and will operate at a pressure of 1—3 mm., is described.

(B) Tests were made with a series of enamels at atm. and reduced pressures (1—3 mm. Hg) on sheet and on vac.-melted electrolytic Fe. It was shown that: (1) enamels contain large amounts of dissolved and dispersed gases, (2) the interaction of Fe or Fe_2O_3 with the enamel causes migration of bubbles to the surface to form defects, (3) in general, the inherent attractive forces between the enamel and the metal are sufficient to resist the forces of differential expansion, but that the greater adherence of enamels containing NiO and MnO is due to the formation of Fe dendrites at the interface. J. A. S.

Drying of magnesite bricks: volume changes accompanying hydration. J. H. Chesters and W. Weyl (Trans. Ceram. Soc., 1933, **32**, 201—216).—The hydration of calcined $MgCO_3$ has been studied under controlled conditions of temp., humidity, rate of drying, etc. Hydration is most rapid over the range 85—100° and is accompanied by a large expansion (*e.g.*, 1%) which may cause cracking or complete crumbling of the block during drying. Once the material is dried it must be kept dry and condensation at "cold spots" in the kiln should be avoided. Drying in vac. increases the rate of drying without the need for raising the temp. to the danger zone of hydration (85—100°). The application of this technique to large shapes is suggested. J. A. S.

Low-temperature comparator for coefficient of expansion of ceramic bodies. H. E. Davis (J. Amer. Ceram. Soc., 1933, **16**, 229—231).—A simple dial-gauge (10^{-4} in.) dilatometer for use up to 300° is described. J. A. S.

Polishing glass.—See X. **Cohesion and viscosity of clays.**—See XVI.

Patents.

Glass furnace. J. L. Drake, Assr. to Libbey-Owens-Ford Glass Co. (U.S.P. 1,870,242, 9.8.32. Appl., 12.1.28).—The melting end of a glass tank tapers both vertically and horizontally, being largest at the outlet end. Regenerative burners in the side walls are more closely spaced at the narrow end. B. M. V.

Apparatus for making glass and vitreous enamels. G. H. McIntyre and R. W. Stuart, Assrs. to Ferro Enamel Corp. (U.S.P. 1,870,636, 9.8.32. Appl., 5.8.30).—Superposed on a melting furnace is a preheating chamber with conical bottom and central hole for discharge of material into the furnace; it is covered by a rotating roof with radial slot for feeding the raw material in a distributed manner. B. M. V.

Cadmium-containing glass and tubing made therefrom. W. H. Rising, Assr. to Corning Glass Works (U.S.P. 1,864,858, 28.6.32. Appl., 15.3.30).—Claim is made for Zn borosilicate glasses containing

$< 2\%$ Pb as PbO, coloured yellow with CdS or red with CdS and Se and containing sufficient (0·5—2%) CdO to prevent pptn. of ZnS in a highly dispersed form which gives an opal-white effect. A. R. P.

Manufacture of splinterless glass. J. W. C. Crawford, J. S. B. Fleming, and Imperial Chem. Industries, Ltd. (B.P. 391,114, 13.10.31).—An unpolished sheet of plastic material, made by mixing 100 pts. of polymerised vinyl acetate with 10 pts. of Bu_2 phthalate and rolling the mixture at 90°, is placed between two sheets of glass and the resulting " sandwich " is pressed at 0·5—5 kg./sq. cm. at $> 70°$ (80°). A. R. P.

Ovens or kilns for manufacture of earthenware tiles, bricks, and the like. G. H. Downing and H. R. Holding (B.P. 391,175, 16.10.31).—The combustion gases from each furnace in the wall of the kiln are divided among 3 vertical flues, the combustion in any flue being adjusted by opening auxiliary air inlets in the outer face of the wall. B. M. V.

Salt-glazing of brick and other clay products. J. B. Whitacre, Assr. to Whitacre-Greer Fireproofing Co. (U.S.P. 1,867,294, 12.7.32. Appl., 14.8.31).—A glaze, the colour of which is unaffected by metallic impurities in the brick (Fe_2O_3), is obtained by firing to the vitrification temp., lowering the temp. by approx. 150°, and " salting " in an oxidising atm. which is maintained throughout the cooling period. The cooling should be as rapid as possible consistent with freedom from crazing ; the attainment of the oxidising atm. is facilitated by a very open setting. J. A. S.

Manufacture of refractory substances. T. R. Haglund (B.P. 391,662, 18.8.32. Ger., 22.8.31).—A spinel material, MgO,R_2O_3 (R_2O_3 being Al_2O_3 or a mixture of Cr_2O_3 and $\nless$ 10% of Al_2O_3), containing 8—40% of lower-m.p. substances (*e.g.*, silicates, titanates, etc.) is melted at 1800—2000°, cast, and annealed at 1000—1500°. J. A. S.

Zircon refractory. W. G. Bjorkstedt, Assr. to Doherty Research Co. (U.S.P. 1,872,876, 23.8.32. Appl., 11.11.26. Renewed 20.5.30).—H_3PO_4 is used as a binder. 0·1% of P_2O_5 is sufficient to cause some coherence ; 6% is recommended and claimed because the mixture will neither expand nor contract on firing at 290—300°. Less P_2O_5 causes shrinkage, and more, expansion. B. M. V.

(a) **High-temperature transfer material.** (b) **Making high-temperature insulating products.** J. D. Morgan, Assr. to Doherty Research Co. (U.S.P. 1,873,013—4, 23.8.32. Appl., [a] 8.4.30, [b] 16.12.30).—(a) Conducting refractory bricks etc. are composed of SiC 20—80 (50), fused Cr_2O_3 13—73 (43), and powdered Cr_2O_3 4—6 (5) pts. (b) A heat-insulating, refractory brick (etc.) having a large proportion of voids is produced from zircon together with 1 wt.-% of Al powder coated with glue or other colloid, and 15% of S, 6% of P_2O_5 ($H_3PO_4 : Na_2HPO_4$, aq. $= 1 : 1$). The wet mixture is initially heated to 260—375° and fired to $\nless$ 1260°. B. M. V.

Preparation of bentonite compositions. H. Batterman, Assr. to A. P. Hunt (U.S.P. 1,873,262, 23.8.32. Appl., 23.7.30).—For the prep. of a polishing powder a dry powder of bentonite is sprayed with a solution of an electrolyte, *e.g.*, NaCl, in such quantity that the powder still remains dry after complete absorption has occurred. B. M. V.

Improving clay. R. Cross, Assr. to Silica Products Co. (U.S.P. 1,873,296, 23.8.32. Appl., 23.9.29).—$CaSiO_3$ is either formed in the clay from suitable chlorides and Na_2SiO_3, or is formed and purified separately and incorporated as dry powder. The resulting clay has the properties of bentonite. B. M. V.

Fluorides from glass-smelter gases.—See VII. **Facing walls with glass.**—See IX. **Alloy for sealing into glass.**—See X. **Rubber cement [for glass].**—See XIV.

IX.—BUILDING MATERIALS.

Utilisation of waste products from manufacture of alumina from kaolin. P. P. Budnikov and V. M. Dorofeev (Ukrain. Chem. J., 1932, 7 [Tech.], 185—188).—The waste products (average SiO_2 26·6, Al_2O_3 7·6, Fe_2O_3 1·25, CaO 28·5, K_2O 2, and Na_2O 13·2%) can be utilised in the manufacture of Portland and anhydrite cement. R. T.

Utilisation of Krivoi Rog clinker for manufacture of clinker Portland cement. P. P. Budnikov and L. Gulinova (Ukrain. Chem. J., 1932, 7 [Tech.], 205—212).—Krivoi Rog clinker mixed with 15—30% of Portland cement yields satisfactory cement. R. T.

Determination of free lime in cements containing asbestos. L. Lucchi (Annali Chim. Appl., 1933, **23**, 145—151).—Bessey's method for determining free CaO in hydrated cement (B., 1931, 949) is inapplicable to asbestos cements, owing to the great acceleration of combination between the asbestos and free CaO caused by rise in temp. Provided that the temp. is kept below 40°, good results are obtainable by Zawadzki and Lukasziewicz's method (B., 1931, 536). T. H. P.

Strength and durability tests of mortar-mix mortar. M. G. Spangler (J. Amer. Ceram. Soc., 1933, **16**, 246—249).—Tension, compression, bond strength, freezing and thawing, and absorption tests were carried out on sand-cement (3 : 1) mortars in which up to 50% of the cement had been replaced by ground clay (" mortar-mix ") and by $Ca(OH)_2$. Mortar-mix produced mortars at least as strong and durable as those containing $Ca(OH)_2$ as plasticiser. J. A. S.

Patents.

Mineral cement mixtures [facing of walls with glass]. G. E. Heyl (B.P. 391,997, 7.6.32).—The surfaces of the glass and the wall are first painted or varnished, and then a mixture of an oil-containing bitumen or resinous binder and a H_2O mixture of Portland cement is used as an intermediate cementing material. C. A. K.

Cement concretes. G. S. Eldridge (B.P. 391,582, 14.3.32).—Emulsifying agents in insufficient quantity to form a stable froth are added to a concrete aggregate. These include alkaline coal-tar distillates and flotation agents used in ore concn. C. A. K.

Improvement of cement, cement-mortar, and concrete. H. Opalsky (B.P. 392,464, 29.11.32).—Protein, *e.g.*, casein ($\ngtr$ 2·5%), and an alkaline-earth oxide or hydroxide ($\not> 12\%$), preferably CaO or $Ca(OH)_2$, are added to the cement before or during the mixing. S. H. M.

Plastic compositions [containing calcined gypsum]. Certain-Teed Products Corp. (B.P. 392,024, 29.7.32. U.S., 30.7.31).—A plaster for casting consists of a mixture of calcined gypsum, 0·2—3% of an alkali or alkaline earth, and 0·4—3% of a H_2O-sol. gum, *e.g.*, gum arabic. Suitable fillers may be incorporated. C. A. K.

Asphalt emulsion.—See II. **Anhyd. $MgCl_2$ from cement.**—See VII. **Rubber cement [for wood].**—See XIV.

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

Behaviour of steel pipes under the action of strongly corrosive substances. F. Eisenstecken (Gas- u. Wasserfach, 1933, **76**, 78—84, 95—97).—Methods of protecting steel tubes used for carrying gas and H_2O underground are described and an account is given of means employed in testing the various protective coatings employed. Tests are made for resistance of the coating to (*a*) fracture on impact or bending, (*b*) the usual constituents of H_2O, and (*c*) the various constituents of coal gas, especially the aromatic hydrocarbons and their derivatives. Examples with illustrations are given of the effect of stray currents in destroying underground gas and H_2O pipes; this action and means for preventing it form the subject of a short discussion. A. R. P.

Measurement of polish in order to determine its bearing on corrosion of non-oxidisable steels. J. Cournot and (Mlle.) L. Halm (Compt. rend., 1933, **196**, 1017—1018; cf. B., 1933, 22).—The coeff. of polish is defined as the ratio of the intensity of the light reflected at 45° to that of the direct ray; a method of measuring it photoelectrically is described. The results indicate the importance of the fineness of the polishing powder, and in the case of coarse powders the effect of the direction of polishing. C. A. S.

Mechanism of the cutting and polishing [of metals and glass]. L. Hamburger (Z. Metallk., 1933, **25**, 29—32, 58—61).—Polishing is primarily and principally a process of removing metal particles from the surface by an adsorption action; with careful work on medium-hard metals the particles removed at room temp. have a magnitude of 3—30 atoms. In later phases of the polishing a portion of the sheared-off amicrons adhere to the minute riffles in the metal surface. In very highly-polished surfaces of the more refractory metals the mean particle size is small in comparison with the wave-length of visible light, but large in comparison with the at. dimensions. The carefully polished surface layer of a cryst. substance consists of lamellæ of similarly oriented crystallites of sub-microscopic magnitude showing a frequency distribution of the various-sized particles. The polishing penetrates inwards towards the centre of the metal through a relatively thick transitional layer which undergoes considerable structural changes. The nature of polished surfaces is complicated partly by the adsorption and inclusion of foreign substances, partly by the occurrence of more or less distorted transitional spots between the numerous crystallites, and more generally by a physical metastability. In polishing glass containing alkalis, the alkali content of the surface is reduced by the removal of loosely held alkali from the SiO_2-rich framework. A. R. P.

Determination of sulphur in cast iron and steel. G. T. Michaltschischin (Ukrain. Chem. J., 1932, 7 [Tech.], 213—221).—A comparison of results obtained gravimetrically with those given by various modifications of Schulte's method indicates that the use of 20% H_2SO_4 for dissolution of metal gives the best results. R. T.

Determination of zirconium in steels. Selenious acid–phosphate method. S. G. Simpson [with W. C. Schumb] (Ind. Eng. Chem. [Anal.], 1933, **5**, 211—212).—By pptg. the Zr first as selenite and then as phosphate an advantage is obtained over either single method. W and other elements do not interfere. Some results are given. E. S. H.

Indicators for determining chromium and vanadium in alloy steels. Oxidised diphenylaminesulphonic acid and oxidised diphenylamine. H. H. Willard and P. Young (Ind. Eng. Chem. [Anal.], 1933, **5**, 154—158).—The controlled oxidation of diphenylaminesulphonic acid by $K_2Cr_2O_7$ and $FeSO_4$ gives an indicator which is satisfactory for the determination of V and Cr in W steels. With a slight variation in procedure oxidised $NHPh_2$ may be used. E. S. H.

[Determination of] chromium and vanadium in alloy steels. H. H. Willard and P. Young (Ind. Eng. Chem. [Anal.], 1933, **5**, 158—162).—W is kept in solution as a complex fluoride throughout the analysis. Excess of $KMnO_4$ used in the determination of V may be reduced by NaN_3, followed by boiling to remove HN_3, or by $NaNO_2$ at room temp., followed by urea to remove excess of $NaNO_2$. Oxidised diphenylaminesulphonic acid (cf. preceding abstract) is used as an internal indicator in determining V and Cr with $FeSO_4$. Direct addition of excess of $FeSO_4$ and titration with $KMnO_4$ is applicable for determining Cr. The procedure is also applicable to steels containing no W, and in this case oxidised $NHPh_2$ may be used as indicator. E. S. H.

Influence of deformation and annealing on the coefficient of thermal expansion of copper. H. Sieglerschmidt (Z. Metallk., 1932, **25**, 38—42).—The coeff. of thermal expansion of Cu is increased by stretching or compressing the metal by $> 5\%$, but on annealing it decreases again above 150° and reaches the normal val. at $> 300°$. These effects are attributed to the presence of elastic stress produced by the cold-work and to its gradual removal on annealing. The coeff. is isotropic in cold-rolled, fully annealed Cu sheets in which the cubic plane of the crystallites lies in the plane of rolling. A. R. P.

Elasticity of copper sheets. J. Weerts (Z. Metallk., 1933, **25**, 101—103).—The modulus of elasticity (*E*) of cold-rolled (I) and recryst. (II) Cu sheet has been determined in various directions in the rolling plane and the results are compared with the vals. calc. from the crystallite orientation and those obtained for single crystals. For (I) the min. val. of E (in 10^4 kg. per sq. mm.) is 1·09 (calc. 0·95) at 45° to the direction of rolling and the max. 1·40 (calc. 1·58) in the direction of rolling and transverse thereto. For (II) the converse is true, the corresponding vals. being 1·23 (1·33) and 0·69 (0·68). A. R. P.

Annealing of metal [brass] strip in continuous annealing furnaces. O. Junker (Z. Metallk., 1933, **25**, 45—49).—The Erichsen val. and tensile properties of 63 : 37 brass strip of various widths (w) and thicknesses (b) after annealing in a continuous furnace are shown in tables and graphs and the corresponding microstructures in a series of photomicrographs. The temp. of the furnace must be so regulated as to prevent formation of brittle β which lowers the Erichsen val., hence 800° should not be exceeded. The foremost part of the furnace is best maintained at about 780° so as to heat the strip rapidly to 600°, at which temp. it should be held during the remainder of its passage through the furnace. Provided that the structure remains homogeneous α, quenching has little effect on the properties produced by the heat treatment. Speeds of passage through the furnace for various vals. of b and w are tabulated. A. R. P.

Theory of [ore] flotation. K. Kellermann (Kolloid-Z., 1933, **63**, 220—226; cf. B., 1930, 867).—Ostwald's "linear" theory (A., 1932, 333, 1085) provides a more satisfactory explanation of the phenomena observed in the practice of ore flotation than do the older theories. In particular, it accounts for the action of "poisons" and for the unfavourable effect of an excess of the frothing agent. F. L. U.

Some actual problems of furnace operation in the annealing of metals. V. Paschkis (Z. Metallk., 1933, **25**, 93—95, 117—121).—A theoretical discussion of the heat economics of annealing furnaces. A. R. P.

Rate of softening of deformed metals by recovery and recrystallisation. F. Sauerwald and W. Globig (Z. Metallk., 1933, **25**, 33—38).—Cylinders of fully-annealed, coarse-grained Cu and Fe were deformed under a drop hammer at high temp. and the rates of crystal recovery (I) and recrystallisation (II) observed on annealing at various temp. The results show that there are three distinct temp. ranges in the annealing process. At relatively low temp. (I) alone occurs and no signs of (II) are observed even after prolonged annealing; the hardness (H) decreases very slowly as a linear function of the time. At a relatively high temp. (II) takes place rapidly and H falls rapidly with increasing grain size. Between these two extremes there is a temp. range in which (I) occurs during the early stages of annealing followed, sometimes quite suddenly, by (II) with a rapid fall in H; this is particularly marked with Fe at 630° after a 16% deformation. The temp. ranges at which these different effects occur depend to a large extent on the initial grain size of the metal and on the degree of deformation. In the middle range complete softening does not always occur, despite (II) and subsequent growth of the new crystals. A. R. P.

Spectrographic analysis of metals in practice. O. Findeisen (Z. Metallk., 1933, **25**, 12—16).—A review of recent work, with special reference to the application of the logarithmic sector method to the determination of small quantities of Bi, Cu, and Sn in commercial Pb and of Ni in a Ni–Cu–Al alloy. A. R. P.

Shape and structure of lead shot. G. Tammann and K. L. Dreyer (Z. Metallk., 1933, **25**, 64).—The addition of As to Pb used in the manufacture of shot has no effect on the surface tension, but the As_2O_3 produced during melting and pouring dissolves the thin PbO film on the drops, forming readily fusible (m.p. about 200°) $Pb_3As_2O_6$ which remains as a liquid film around the drop of molten Pb and allows it to assume the spherical form which is retained when the drop solidifies. Sb may be added to the Pb as a hardener. The structure of the shot shows several primary dendrites of Pb surrounded by the Pb-Sb or Pb–As eutectic. A. R. P.

Precipitation-hardening phenomena in britannia metal. M. von Schwarz and O. Summa (Z. Metallk., 1933, **25**, 95—97).—The hardening of britannia metal on heating at $>$100° is attributed to pptn. of SnSb and not of a Cu–Sn compound as suggested by Egeberg and Smith, since hardening occurs in alloys free from Cu. The SnSb pptn. occurs only when the metal has been cold-worked to a reduction of $>$ 50% before ageing. A. R. P.

Influence of pretreatment on the mechanical properties and electrical conductivity of aluminium containing magnesium silicide. G. Grube and F. Vaupel (Z. Metallk., 1933, **25**, 84—88).—Ageing of quenched aldrey wires at room temp. results in a slow diminution in electrical conductivity (C) and at first a rapid and then a slow increase in the tensile strength (K) with practically no change in the elongation. On ageing at 155°, however, K increases from 26 to 32 kg. per sq. mm. in 90 hr. whilst C rises from 29 to 31 m./ohm sq. mm. in 1 hr. and to 32·7 in 90 hr. If the wire is drawn after quenching C rises on ageing at 155° to 33·2 m./ohm sq. mm. in 80 hr., whilst K rises to 36 kg. per sq. mm. in 5 hr. and then falls almost linearly to 28 kg. per sq. mm. in 90 hr. Hence, for use as a conductor, aldrey should be annealed at 550—560°, quenched, drawn to the required size, and aged at 155° until the desired vals. of C and K are obtained. A. R. P.

Formation of blowholes in the heat-treatment of age-hardenable aluminium alloys. P. Brenner, F. Sauerwald, and W. Gatzek (Z. Metallk., 1933, **25**, 77—80).—Minute blowholes are formed on the surface of many Al alloy sheets when annealed in the air, nitrate baths, or H_2 prior to age-hardening. Annealing in A or a high vac. prevents this and no blowholes are formed on subsequent heating in a salt-bath or in N_2, but some are formed in H_2. From these results it is concluded that blowhole formation is due to reaction between a constituent of the metal (*e.g.*, occluded gas or segregated eutectic) and the annealing medium. A. R. P.

Gas content of cast aluminium alloys. H. Nipper (Z. Metallk., 1933, **25**, 65—67).—The mean gas content (A) of cast Al is 3·5—7 c.c. per 100 g.; the gas consists of 78% H_2, 15—16% CO, and 6—7% CO_2. The corresponding figures for silumin (I) are 2·26—3·4 c.c., 70—71% H_2, 22% CO, and 8% CO_2. The best method of determining *A* consists in melting the metal or alloy in vac. in an Al_2O_3 crucible. The *A* val. of Al alloys is increased by overheating, but slow cooling through the m.p. followed by remelting at a min. temp. removes a good deal of the occluded gas. Treatment of the molten metal with N_2 or, better, with Cl_2 removes most of the gas and increases the *d*; further addition of Mg or Ca has no beneficial effect. Cl_2 treatment of (I) increases the *d* but has a deleterious effect on the mechanical properties produced by the modification treatment; modification after chlorination reintroduces gas. The max. *d* and min. *A* in (I) are obtained by heating at 900° prior to casting and casting into preheated moulds to allow the max. amount of gas to escape during solidification. A. R. P.

Action of liquid fuels containing alcohol on aluminium and its alloys. O. Bauer and G. Schikorr (Z. Metallk., 1933, **25**, 44).—Addition of up to 20% of 99·7% EtOH to petrol, C_6H_6, and mixtures of these has little effect in increasing the very slight corrosive action of these fuels on Al, "anticorodal," and "pantal" unless $> 0 \cdot 5\%$ of H_2O is present in the mixture. With $> 20\%$ of EtOH corrosion becomes more severe and is very marked if $> 1\%$ of H_2O is present. In all cases the Bauer–Vogel coating process affords complete protection. A. R. P.

Autogenous welding of aluminium and its alloys. H. Bohner (Z. Metallk., 1933, **25**, 50—52). H. Buchholz (*Ibid.*, 52).—A discussion of various difficulties met with in welding Al and its age-hardenable alloys. To prevent coarse grain growth in the welded seams of Al sheet the use of a welding rod containing 0·15% Ti is recommended; hammering the seams serves to restore part of the strength lost during welding. In welding alloys with a high Cu content there is danger of separation of coarse $CuAl_2$ in the seams, rendering them brittle; this may be avoided by using a welding rod containing much less Cu so as to dil. the Cu content of the metal in the seam. The presence of other hardening constituents in the welding rod improves the strength and hardness of the seam after appropriate heat or mechanical treatment or both. A. R. P.

Deposition of copper and silver from iodide solutions. M. Schlötter, J. Korpiun, and W. Burmeister (Z. Metallk., 1933, **25**, 107—111).—Deposition of Cu from CuI–KI electrolytes yields pure Cu only when the c.d. is $< 0 \cdot 15$ amp. per sq. dm.; at higher c.d. the amount of CuI adsorbed by the deposit increases rapidly and the metal becomes brittle and hard. Adsorption of AgI by Ag deposited from similar electrolytes is much less pronounced, but from baths operated at 5° with > 10 amp. per sq. dm. hard brittle deposits having the colour of Au are obtained; these deposits lose their colour on exposure to bright sunlight or by treatment with aq. NaCN or aq. $Na_2S_2O_3$. *X*-Ray examination of Cu and Ag deposits containing the corresponding iodide show that part of the latter is in solid solution and the remainder dispersed throughout the metal in a very finely-divided form. A. R. P.

Castings for sulphite-pulp service.—See V. **Cr-plating in calico-printing.**—See VI. **Enamel adherence.**—See VIII.

Patents.

Cupola furnace. A. L. Boegehold, Assr. to Gen. Motors Research Corp. (U.S.P. 1,872,057, 16.8.32. Appl., 24.2.30).—A cupola for cast Fe is operated with a reducing atm., the heat loss due to formation of CO being recovered by burning the gases in an air heater; the ingoing gas is also dried by an absorbent which is regenerated by heated air. Air-locks for charging are described. B. M. V.

Manufacture of iron. J. E. Fletcher (B.P. 391,248, 10.12.31).—Molten slag obtained in the puddling of Fe is poured on to a pile or bloom of hot, mild-steel scrap and the mass is squeezed to expel the excess of slag and produce a ball of wrought Fe. A. R. P.

Production of porous metal [iron]. C. F. Sherwood, and Manganese Bronze & Brass Co., Ltd. (B.P. 391,155, 13.10.31).—A mixture of 95—98% of sponge Fe with 5—2% of a volatile lubricant (stearic acid) is briquetted, the briquettes are sintered by electric heating in an inert or reducing atm., and the resulting porous body is quenched in oil. The process is applicable to the production of bearings, bushings, and brushes for electrical machinery. A. R. P.

Cast-iron roll. E. K. Lewis and E. Wenz (U.S.P. 1,870,580, 9.8.32. Appl., 29.3.29).—The alloy comprises Fe with C 2—3·4, Cr 0·8—2·5, Ni 0·4—3·0, Si 1·25—3·0, and Mn 0·4—1·0%, proportioned to give a close-grained grey Fe irrespective of chilling; the alloy during casting is lightly chilled to produce an outer condensed grain with not much difference in hardness from surface to centre. B. M. V.

[Nickel–chromium cast-iron] alloy. P. D. Merica and J. S. Vanick, Assrs. to Internat. Nickel Co., Inc. (U.S.P. 1,867,018, 12.7.32. Appl., 3.7.26).—The alloy consists of cast Fe with 2—4% C, 10—20% Ni, 2—10% Cu, 0·25—3% Si, and $\ngtr$ 10% Cr. The Cu present is $< \frac{3}{4}$ of the Ni content. The alloy is non-magnetic, has a high electrical resistance, and is free from growth. A. R. P.

[Martensitic cobalt–chromium–iron] alloy. R. E. Bissell, Assr. to Thompson Products, Inc. (U.S.P. 1,866,836, 12.7.32. Appl., 4.9.28).—The alloy contains Cr 14, Co 8·5, Si 3·5, and C 0·25—0·35%; a martensitic structure is obtained by annealing for 4 hr. at 900°, cooling to 725° at 25° per hr., and then air-cooling. The C may be omitted and the Si replaced by 1·8% Al. A. R. P.

Production of chromium–aluminium steels. H. Gonschewski (B.P. 391,848, 2.11.31. Ger., 29.11.30).—Mild steel is alloyed in the high-frequency induction furnace with Cr and Al in such proportions that the max. Al content is 16—11% and the min. 11—5% when the Cr is 1—6%. Up to 1% of the Cr may be replaced by W, Ni, Co, or Mo and up to 3% of the Al by Si, Be, Ti, or V. [Stat. ref.] A. R. P.

Treatment of alloys containing iron and manganese. H. Löfquist (B.P. 391,112, 17.9.31).—The alloy is melted and blown until all the Mn has passed into the slag; this slag is then melted with a new lot of alloy so that the Fe in the slag oxidises the Mn in the alloy, FeS or FeS_2 being added to reduce the viscosity of the high-Mn slag obtained. Alternatively, the alloy is melted with a slag rich in FeS to obtain a metal with a low Mn content and a slag high in Mn, the slag is removed, and the metal treated with an air blast to remove the remainder of the Mn as a high-Fe-low-Mn slag, and finally the second slag is returned with fresh FeS_2 for the first stage of the treatment of a new charge of alloy. A. R. P.

Composite conductor [for sealing into glass]. H. Scott, Assr. to Westinghouse Electric & Manufg. Co. (U.S.P. 1,872,354, 16.8.32. Appl., 8.2.30).—A ferrous alloy is surrounded by a sheath of Cu; the coeff. of expansion may be adjusted by altering the proportions. Thus, for borosilicate glass, the Cu should be 10—40% of the total cross-section, and for Nonex glass 5—20%, the coeff. of the latter being $(3—5) \times 10^{-6}$. The core alloy is Ni 25—34, Co 4—17, Mn $\not>$ 1%. B. M. V.

Cleaning of metal. H. C. Mougey, Assr. to Gen. Motors Research Corp. (U.S.P. 1,872,091, 16.8.32. Appl., 24.9.30).—Surfaces of Fe etc. which have been cleaned with caustic or other ionisable solutions are rinsed with H_2O containing only enough H_3PO_4 to form rust-inhibiting phosphates, *e.g.*, 0·02—0·25%, and are then dried. B. M. V.

[Inhibitor for] bath for metal-pickling processes. G. L. Magoun, Assr. to Rubber Service Labs. Co. (U.S.P. 1,868,214, 19.7.32. Appl., 30.9.31).—An inhibitor for H_2SO_4 baths for pickling steel comprises the reaction product of CH_2O (1 mol.) with diphenylguanidine (2 mols.) and CS_2 (1 mol.). A. R. P.

Sulphurised cinchona bark inhibitor [for metal-cleaning and pickling baths]. G. Lutz, Assr. to Grasselli Chem. Co. (U.S.P. 1,867,414, 12.7.32. Appl., 16.12.31).—Small amounts (0·05—0·5%) of sulphurised cinchona bark alkaloids, *e.g.*, cinchonine, quinoidine, are added to the baths containing dil. non-oxidising acids. E. H. S.

Ore flotation. I. H. Derby and O. D. Cunningham, Assrs. to P. C. Reilly (U.S.P. 1,873,115, 23.8.32. Appl., 30.12.30).—A collector is formed from the interaction of a P sulphide and an alcohol, preferably an unsubstituted aliphatic alcohol (up to C_5). B. M. V.

Metallurgical process. J. Allingham (U.S.P. 1,870,703, 9.8.32. Appl., 17.4.31).—Org. salts of Au, Ag, Cu, and/or Hg, formed by the action of humus in the patio or pan-amalgamation process, are recovered by making the material slightly alkaline, then oxidising it, treating it with SO_2, and finally dissolving the vals. in aq. $Na_2S_2O_3$. B. M. V.

Protection of [metal] apparatus against [carboxylic] acids. N. B. Grillet, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,870,953, 9.8.32. Appl., 17.11.27. Ger., 4.2.27).—Apparatus of which the base metal is Cu is protected against corrosion by such acids as AcOH etc. by elimination from the materials of all O chemically combined but capable of oxidising the metal, and exclusion of all free O_2 whether atm. or in solution. Various treatments for different circumstances are described. B. M. V.

Refining of bismuth. W. C. Smith, Assr. to Cerro de Pasco Copper Corp. (U.S.P. 1,870,388, 9.8.32. Appl., 21.1.31).—In the separation of metals from Bi alloys, Cl_2 alone removes Pb down to 0·04—0·05%; Cl_2 at 400—425° followed by air, preferably after transferring to a clean kettle, effects complete removal of Pb. B. M. V.

Separation of the component constituents of a complex metalliferous dust. A. L. J. Queneau (U.S.P. 1,872,169, 16.8.32. Appl., 7.6.29).—Complex Zn ore is chloridised and the metallic chlorides are volatilised by sintering with aq. $CaCl_2$ from the end of the process; the dust and fume are leached with dil. H_2SO_4, ZnO being added in the later stages to ensure pptn. of Fe. The insol. compounds of Pb, Ag, etc. are filtered off and the filtrate is treated with CaO and Zn, the impure Cd ppt. being leached with a min. of HCl and the $ZnCl_2$ solution sent to the main solution. $Zn(OH)_2$ and $CaSO_4$ are then pptd. by $Ca(OH)_2$ or other basic Ca compound and the $CaCl_2$ liquor is obtained for use again in the first process. B. M. V.

Condenser for zinc vapours. E. H. Bunce, Assr. to New Jersey Zinc Co. (U.S.P. 1,871,657, 16.8.32. Appl., 30.8.28).—A condenser which may effect fractionation of Pb and Cd is formed of a no. of superposed chambers decreasing in size upwards, through which the Zn vapours take a zigzag course. B. M. V.

Melting of [metal] borings. E. L. Crosby and A. E. Rhoads, Assrs. to Detroit Electric Furnace Co. (U.S.P. 1,871,305, 9.8.32. Appl., 6.9.30).—The material is melted by the radiant heat of an electric arc that does not use the bath as an electrode. The furnace is oscillated 2—4 times a min. and the level of the bath is maintained const. B. M. V.

Welding. A. G. de Golyer (U.S.P. 1,872,254—5, 16.8.32. Appl., 10.4.31).—Instead of using a metallic rod in conjunction with an arc or O_2–C_2H_2 flame, a mixture of the oxide of the desired metal with a boride of a metal or semi-metal (11 are named) which is highly exothermic on combination with O is employed. B. M. V.

Hard alloys. Tool Manufg. Co., Ltd. (B.P. 392,038, 2.9.32. Ger., 3.9.31).—Claim is made for a hard sintered alloy containing $>$ 50% of one or more borides, and/or one or more silicides, at least one carbide of high m.p., and at least one metal (0·5—25%) of lower m.p. Examples are: (*a*) W boride 62, WC 33, Co 5%; (*b*) Ti boride 75, TiC 20, Ni 5%; (*c*) TiSi 55, WC 33, Ni 12%; (*d*) Ta boride 43, Cr silicide 18, Ta carbide 32, Co 7%. A. R. P.

Hard [tungsten carbide] alloys. Tool Metal Manufg. Co., Ltd. (B.P. 391,984, 21.5.32. Ger., 18.7.31).—Claim is made for a sintered mixture of carburised W (3—7% C), $\not>$ 25% Ni or Co, and $\not>$ 50% TiC. [Stat. ref.] A. R. P.

Metal compositions [containing niobium carbide]. Brit. Thomson-Houston Co., Ltd., Assees. of F. C. Kelley (B.P. 391,933, 11.2.32. U.S., 14.2.31).—Claim is made for sintered mixtures of NbC with 3—25% of a binder, *e.g.*, Ni, Co, Fe, with or without Cr, Mo, and W. A. R. P.

Purifying light metal [magnesium and its alloys]. J. A. Gann, Assr. to Dow Chem. Co. (U.S.P. 1,871,316, 9.8.32. Appl., 4.10.28).—The metal is melted and agitated in a large quantity of flux at a temp. 100—300° above its m.p., and then allowed to cool to casting temp. A suitable flux consists of $MgCl_2$ and NaCl with $BaCl_2$ to adjust the sp. gr. to about that of the metal. B. M. V.

Making a metallic powder. J. A. Gann, Assr. to Dow Chem. Co. (U.S.P. 1,871,450, 16.8.32. Appl., 19.4.29).—The fire risk of pulverising a brittle alloy of Mg and Al (or Cu or Zn) is reduced by adding $\not> 10\%$ of polished flake Al (or Cu or Zn). B. M. V.

Casting readily oxidisable metals. J. A. Gann, Assr. to Dow Chem. Co. (U.S.P. 1,871,315, 9.8.32. Appl., 30.6.30).—The mould is formed of pulverised C, a plasticiser, *e.g.*, pulverised soapstone, and a binder comprising a volatile, non-aq. liquid, *e.g.*, oil. B. M. V.

Surface treatment of aluminium or aluminium alloys. A. H. Stevens. From R. S. Dunham (B.P. 391,903, 17.12.31).—The adsorbent oxide coatings produced on Al and its alloys by anodic oxidation or chemical treatment are treated first with a salt of a metal which is adsorbed in the coating and then with a sol. salt of an alkali metal which ppts. an insol. compound of the first metal, *e.g.*, $Pb(OAc)_2$ and $K_2Cr_2O_7$, Ni or Co salt and $(NH_4)_2S$, $K_4Fe(CN)_6$ and $FeCl_3$, or $UO_2(OAc)_2$ and $K_4Fe(CN)_6$. A. R. P.

[Copper-silicon-nickel] aluminium base alloys [for pistons]. A. H. Stevens. From Aluminium, Ltd. (B.P. 391,737, 9.1.33).—The alloy contains Al with 2—6 (4)% Ni, 5—8 (7)% Cu, 5—8 (7)% Si, and 0·01—1% of a metal or metals of the group composed of Ti, Mo, Mn, Cr, W, Fe. A. R. P.

[Aluminium-beryllium] alloys. J. K. Smith, Assr. to Beryllium Development Corp. (U.S.P. 1,868,293, 19.7.32. Appl., 27.1.31).—A light alloy for machine parts comprises Be 70 Al 28·8, Mn 0·6, and Mo 0·6%. A. R. P.

Depositing on chromium. B. Bart, Assr. to Frink Corp. (U.S.P. 1,871,770, 16.8.32. Appl., 24.8.29).—Very accurate commercial mirrors etc. are formed by plating a master mould with Cr, which is then backed with other metal and insulation, stripped, and the bright face of the working mould electrolytically hydrogenised and then used as cathode for the deposition of mirrors which are easily parted, provided an insulating ring is applied around the edge to prevent any keying action. B. M. V.

Heat-treating [Cu] articles.—See I. **S from pyrites.**—See VII. **Arc-welding electrode. Electroplating brush.**—See XI. **Degreasing [metals etc.].**—See XII. **Zn-white.**—See XIII. **Rubber-metal cement.**—See XIV.

XI.—ELECTROTECHNICS.

Photoelectric colorimeter for measuring colour intensities of liquid petroleum products. B. W. Story and V. A. Kalichevsky (Ind. Eng. Chem. [Anal.], 1933, 5, 214—217).—A photoelectric cell is introduced to eliminate the personal equation. Results obtained with lubricating oil solutions in C_6H_6 show that the colour intensities of diluted solutions are as additive as can be expected theoretically, and are superior to other colour scales in use. E. S. H.

Liquid hydrocarbons from C_2H_2.—See II. **Opacity tester.**—See V. **Cr-plating in calico-printing.**—See VI. **Measuring polish on steels. Cu- and Ag-plate.**—See X. **Rubber latex. Conductivity of rubber-lampblack mixes.**—See XIV. **Electrodialysis of soils.**—See XVI.

Patents.

[Electric] furnaces. Wild-Barfield Electric Furnaces, Ltd., C. E. Foster, and J. E. Oram (B.P. 391,170, 8.9.31).—In furnaces in which the heat is transmitted from the heaters to the goods by a circulating fluid, the temp. of that fluid before and after passing through the goods are recorded alternately by the same stylus, thermocouples or other temp.-sensitive devices being alternately put into circuit by the clockwork of the chart. B. M. V.

Electric furnace. A. J. Hanson (U.S.P. 1,872,942, 23.8.32. Appl., 31.12.30).—A method of supporting a zig-zag wire resister is described. B. M. V.

Electric tubular furnaces. L. Mellersh-Jackson. From Siemens-Schuckertwerke A.-G. (B.P. 391,339, 12.7.32).—In a furnace of the pull-through type in which the heaters comprise the tube of the furnace, the tube is divided into sections, the one at the feed end having a lower resistance than the others. Separate transformers are used for each section: that for the outlet has automatic control of the taps, the others are preferably hand-controlled. B. M. V.

Grid-type resistors for use with electric furnaces. Birmingham Electric Furnaces, Ltd. From Electric Furnace Co. (B.P. 391,948, 27.2.32).—A sinuous grid resistor, of V-shaped cross-section, arranged with the apex facing the material to be heated, and with the open side of the V facing the furnace wall, is claimed. J. S. G. T.

Manufacture of electrode elements for rectifiers. H. Shoemaker, Assr. to P. R. Mallory & Co., Inc. (U.S.P. 1,870,425, 9.8.32. Appl., 29.1.29).—Electronegative plates for a dry rectifier are formed of an alloy, *e.g.*, Cu–Zn, the Cu being in excess. Both metals are caused to react with, *e.g.*, S to form the max.-valency compound. The discs may be heated gradually up to 430° during 6—7 hr. and then at low intensity for 1 hr., and afterwards cooled for 5—6 hr. There will be distinct layers of CuS (outer layer) and ZnS. B. M. V.

Copper hemisulphide rectifier. S. B. Kraut and C. E. Margerum, Assrs. to Westinghouse Electric & Manufg. Co. (U.S.P. 1,872,304, 16.8.32. Appl., 2.3.27).—The use of Cu_2S as a coating on Cu or other metal and pressed in contact with oxidised Al is claimed. B. M. V.

Thermionic rectifier. L. Sutherlin, Assr. to Westinghouse Electric & Manufg. Co. (U.S.P. 1,872,359, 16.8.32. Appl., 11.10.27).—The anode is coated with Cr. B. M. V.

Electron-emission material. M. N. Fredenburgh, Assr. to Westinghouse Lamp Co. (U.S.P. 1,870,951, 9.8.32. Appl., 11.7.28).—A large no. of claims are made for the conditions of prep. of mixed alkaline-earth carbonates from their nitrates, $(NH_4)_2CO_3$, and NH_3. B. M. V.

Electrode construction [for thermionic valves etc.]. E. A. FRITZ, Assr. to CUTLER-HAMMER, INC. (U.S.P. 1,871,363, 9.8.32. Appl., 20.9.30).—The cathode is coated with an emission-increasing substance, *e.g.*, BaO and/or SrO, and the grid has a surface of Ta oxide. B. M. V.

Arc-welding electrode. E. MINO, J. MCCANN, M. FISCHER, and T. D. RADCLIFFE, Assrs. to STANDARD OIL CO. OF CALIFORNIA (U.S.P. 1,872,320, 16.8.32. Appl., 2.3.29).—A composition of H_3BO_3 4, borax glass 2, and Fe_2O_3 1 pt. is claimed for use with an electrode flux-coating. B. M. V.

Electron-discharge devices. (A) H. C. RENTSCHLER, (B) E. G. WIDELL, Assrs. to WESTINGHOUSE LAMP CO. (U.S.P. 1,871,344 and 1,871,352, 9.8.32. Appl., [A] 3.1.27, [B] 15.2.29).—(A) The anode has a Ni base and a tip of Th (or W or Ti). The cathode is inactive, being made of Fe or Mn and coated with a metal of the Ce group. The pressure of the inert gas is 5—7 mm. Hg. (B) Part at least of the raw coating material is composed of the oxalates (or other suitable salts) of alkaline-earth metals (*e.g.*, Ba and Sr mixed), which on decomp. by heat yield CO or other reducing gas. B. M. V.

Brush for electroplating and electrocleaning, and anode for use therein. F. CONLIN (U.S.P. 1,866,699, 12.7.32. Appl., 16.4.30).—An anode is arranged on a support (*A*) extending within the flexible portion of the brush bristles (*B*) and is provided with means for spacing *B* from *A*. J. S. G. T.

Cleaning of gases. A. F. MESTON and H. A. WINTERMUTE, Assrs. to RESEARCH CORP. (U.S.P. 1,871,815, 16.8.32. Appl., 26.3.30).—Dirty hot gas, while being roughly cleaned by settling, is subjected to heat exchange with the gas after cleaning and cooling; it is then humidified and passed down through an electrostatic precipitator at a temp. near the dew point, so that the fine dust is pptd. as sludge. B. M. V.

[Electrically] separating and purifying gases. L. W. SKALA, Assr. to SKALA RESEARCH LABS., INC. (U.S.P. 1,871,226, 9.8.32. Appl., 5.7.29).—The gases are diffused through a Pd diaphragm which has its temp. raised by electronic bombardment and is located between anticathode plates. B. M. V.

Insulating material. C. A. STYER, Assr. to WESTINGHOUSE ELECTRIC & MANUFG. CO. (U.S.P. 1,872,358, 16.8.32. Appl., 30.8.28).—An insulating tape for the outer layers of extra high-tension apparatus is composed of asbestos (freed from C by roasting) impregnated with tritolyl or other org. phosphate, the requirements being that the ester should be slightly conducting between room temp. and 125° and have a b.p. $>150°$. B. M. V.

Making [battery] separators. W. S. GOULD and W. B. OSBORNE (U.S.P. 1,871,171, 9.8.32. Appl., 28.4.28).—Wood treated with aq. NaOH and washed with H_2O is impregnated with rubber, which is vulcanised while the wood is subjected to pressure and maintained flat. J. S. G. T.

Volumetric meters. COMP. POUR LA FABR. DES COMPTEURS ET MATÉRIEL D'USINES À GAZ (B.P. 391,344, 22.7.32. Fr., 24.7.31).—In a meter of the type in which a reversed Roots blower or other form of anemometer drives a dynamo having permanent magnets of which the voltage is recorded and/or integrated with time, correction is made for variations of temp. and pressure by two slides automatically moved by such variations along two potentiometer wires. B. M. V.

Treating H_2O.—See I. **Dehydrating emulsions. Removing S from petroleum.**—See II. **Porous Fe. Alloy for sealing into glass. Melting metal borings. Depositing on Cr.**—See X. **Antirachitic products.**—See XIX. **Insulin.**—See XX.

XII.—FATS; OILS; WAXES.

Development of ketone rancidity in fats, fatty acids, and soaps. H. SCHMALFUSS, H. WERNER, and A. GEHRKE (Fettchem. Umschau, 1933, 40, 102—104).—Sterilised fats etc. (including coconut oil, beeswax, etc.) free from micro-organisms may develop ketone rancidity (positive reaction according to Täufel and Thaler, B., 1932, 515) on storage, the process being accelerated by exposure to light and heat. Fatty acids (from C_3 upwards), glycerol, and soaps (K laurate) give the Täufel ketone reaction after irradiation, volatile acidic products being formed in the case of the higher fatty acids and glycerol. E. L.

Action of light on fats. C. H. LEA (J.S.C.I., 1933, **52**, 146—149 T).—The action of light in accelerating the oxidation of fats is discussed, and diagrams are given to illustrate the relative effects produced by light of various wave-lengths.

Significance of the fatty acid carboxyl group in the textile-aid industry. H. T. BÖHME A.-G.; also H. STADLINGER (Fettchem. Umschau, 1933, **40**, 104—105).—Polemical against Lindner (B., 1933, 461). E. L.

Australian Chemical Institute, authorised tentative methods of sampling and analysis for oils, fats, and waxes. (Chem. Eng. Min. Rev., 1933, **25**, 238—248).

Oil-resistant rubber.—See XIV. **Glyceride oils as fungicides.**—See XVI. **Cod-liver oil preps.**—See XX.

PATENTS.

Refining of fats, fatty oils, waxes, and the like. L. ROSENSTEIN and W. J. HUND (B.P. 391,658, 2.8.32. U.S., 21.8.31).—Impurities are removed by extracting the oil with commercial mono- (with di- or tri-)ethanolamine, with the addition, if desired, of liquid NH_3. E. L.

Recovery of pale fatty acids from cottonseed black grease and other acid oils. W. J. TENNANT. From N. V. MAATS. TOT EXPLOIT. DER VEREENIGDE OLIEFABR. "ZWIJNDRECHT" (B.P. 391,825, 28.10.31 and 29.8.32).—The volatile constituents of black grease (etc.), which tend to cause discoloration of the distilled fatty acids therefrom, can be transformed into less volatile, more insol. compounds by oxidation, and thereafter separated. *E.g.*, air is blown through the material (in the presence of a catalyst, if desired) or through the vapours from the still, and the fatty acids are fractionally condensed. The black grease may be pretreated with a solvent to separate the bulk of the fatty acids. E. L.

Manufacture of transparent soap. Henkel & Co. G.m.b.H. (B.P. 392,400, 30.8.32. Ger., 13.11.31).—Transparent soap of high fatty acid content (65%) is obtained by adding sufficient resin to the saponification mixture of fatty matter and alkali of high degree of purity, to retard crystallisation. No other fillers are used. The soap is cooled rapidly in thin layers, and dried at room temp., avoiding crystallisation by supersaturation. The soap is milled at slow speed so as not to incorporate air, compressed to rope (the press-head being cooled), and made into pieces by the usual methods. J. L.

Manufacture of sulphur soap. T. Tanaka (B.P. 392,042, 14.9.32. Jap., 18.9.31).—A stable, non-odorous S soap is prepared by mixing and melting rosin soap with an equal wt. of S, and incorporating a mixture of I–starch, petroleum jelly (or wax, fats, etc.), and ordinary Na or K soap in convenient proportions. E. L.

Prevention of rancidity in soaps. R. E. Divine (U.S.P. 1,869,469, 2.8.32. Appl., 4.12.26).—0·05—1·0% of an amino-sulphonic or -carboxylic acid compound, *e.g.*, sulphanilic, naphthionic, or aminobenzoic acid, or a Na salt thereof, is incorporated. E. L.

Preparing a [jelly-like] detergent material. C. M. Fehr, Assr. to Sterling Products Co. (U.S.P. 1,870,560, 9.8.32. Appl., 1.10.26).—CCl_4 is obtained in jellified form by mixing in approx. equal parts with "red" oil, and saponifying with NaOH (*d* 1·26); after shaking, a stiff jelly is suddenly formed. More CCl_4 can then be incorporated without affecting the stiffness of the product. By using Na_2SiO_3 instead of NaOH, a fine grit of SiO_2 is dispersed throughout the detergent. J. L.

Apparatus for cleaning or degreasing materials. J. Savage, and Imperial Chem. Industries, Ltd. (B.P. 391,454, 24.9.31).—The goods (*e.g.*, metal articles) are subjected to cleansing by solvent vapour, by showers of liquid solvent, and by passage through liquid solvent as they fall through the inner one of two inclined perforated, concentric cylinders, and are conveyed up the annulus between them by means of a screw conveyor. E. L.

Manufacture of synthetic drying oils. A. M. Collins, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,869,668, 2.8.32. Appl., 16.6.31. Cf. U.S.P. 1,812,849; B., 1932, 435).—Divinylacetylene is polymerised by heat (*e.g.*, in presence of a diluent, under pressure etc.); the liquid $COMe_2$-sol. product freed from unpolymerised hydrocarbon dries in air (with or without driers etc.) to hard, resistant films. E. L.

Wax-containing composition. J. D. Lindsay, Assr. to Standard Oil Co. (U.S.P. 1,871,187, 9.8.32. Appl., 6.1.27).—Polishes comprising an amount of wax beyond the solubility at room temp. (*e.g.*, carnauba, $>$ 15%) are manufactured from wax which has been finely comminuted by mechanical means, whereby fluidity is maintained. B. M. V.

Lubricating oils, grease, etc.—See II. **Assistants for textile industries.**—See III. **Textile oil.**—See V.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Use of vegetable lecithins in paint preparations. E. Stock (Farben-Ztg., 1933, 38, 905—907).—The claims that the addition of vegetable lecithins to paint oils retards settling and reduces the amount of oil used were investigated, using a representative range of pigments in linseed oil, with and without the addition of soya lecithin (I). The latter did not reduce the extent of settling in any case, although it appears to give sediments that are easily re-incorporated. No general reduction in oil absorption was observed, as some pigments showed decrease and others increase with the addition of (I). S. S. W.

Determining solvent properties of volatile thinners in varnishes. M. Frandsen (Ind. Eng. Chem. [Anal.], 1933, **5**, 184—185).—Progressively increasing quantities of the thinner are added to 5 c.c. of the varnish base in a series of test-tubes, shaken, and kept for 1 hr. at 25°. The formation of a gummy ppt. is observed by slowly inverting the tube, when the ppt. is seen as a lump at the bottom of the tube. Experiments with petroleum fractions showed that the solvent power increases with decreasing volatility, but other factors are also involved. E. S. H.

The doubly conjugated system in the glycerides of α- and β-elæostearic acids. R. S. Morrell, S. Marks, and H. Samuels (J.S.C.I., 1933, **52**, 130—132 T).—The prep. and properties of the maleic anhydride compounds of α- and β-elæostearin from tung oil are described (cf. A., 1932, 1018), and it is shown that only β gives thermo-hardening films suitable for varnishes. The thermo-hardening properties of the β-compound are due to oxidation of the doubly-linked C atoms remote from the glyceryl end of the mol. In the case of the α-compound, in which the doubly-linked C atoms are nearer to the glyceryl group, steric hindrance is put forward as a possible explanation of the retardation of oxidation. Details are given of the prep. of durable varnishes direct from tung oil in the presence of appropriate solvents. (Cf. Hughes, A., 1933, 565.)

Determination of plasticisers in organic cellulosic plastics. J. D. Ryan and G. B. Watkins (Ind. Eng. Chem. [Anal.], 1933, **5**, 191—192).—The plasticiser is distilled from the plastic at 250—260°/0·1 mm. The procedure is applicable to ethyl- and benzyl-cellulose and to cellulose acetate plastics. E. S. H.

Resin from oils.—See II. **Lint[-cellulose for lacquers].**—See V. **Tolu balsam.**—See XX.

Patents.

Manufacture of zinc white. H. E. Coley (B.P. 391,514, 13.11.31).—Zn is continuously vaporised by using the heat evolved during its partial oxidation, which is effected in a rotary cylinder charged with sufficient air, C, and firebrick to ensure a reducing atm. and to prevent formation of pools of molten Zn. The oxidation is gradually completed in an adjoining rotary cylinder and the oxide vapours are cooled in a H_2O-jacketed tower. S. M.

Preparation of pigment compositions. A. E. Verbyla (U.S.P. 1,870,186, 2.8.32. Appl., 29.9.30).—

The wet paste of pptd. pigment (containing, *e.g.*, 30—50% of H_2O) is mixed with a fatty acid ($\not> C_4$) compound of a vegetable oil, *e.g.*, " acetated " castor or linseed oil; the product may be partly dried before incorporation in cellulose ester lacquers. E. L.

[Water-resistant] sizing material. T. R. Skelton, Assr. to C. A. Doyle (U.S.P. 1,867,234, 12.7.32. Appl., 18.7.28).—Casein, borax, animal glue, paraformaldehyde, and tung oil are used in described manner. S. M.

Manufacture of coating compositions [from rubber latex]. Dunlop Rubber Co., Ltd., E. A. Murphy, and D. N. Simmons (B.P. 391,973, 29.4.32).—Coating compositions suitable for H_2O-paints or distempers are made by mixing irreversible flocculent or granular ppts. of rubber produced from aq. dispersions, with powders of good covering power. The rubber ppts. may be prepared from latex by producing compounding ingredients *in situ*. D. F. T.

Manufacture of synthetic resins. E. Bielouss, Assr. to H. A. Gardner Laboratory, Inc. (U.S.P. 1,866,962, 12.7.32. Appl., 17.5.30).—A phenol–aldehyde type of resin is made in the presence of a natural resin, which is then esterified with glycerin etc.; an org. polybasic acid and a polyhydric alcohol are then condensed together in the mixture. The order of the process can be varied. The products are sol. in oils and miscible with nitrocellulose solutions. S. M.

Manufacture of polyhydric alcohol–polybasic acid condensation products. Imperial Chem. Industries, Ltd., and W. Baird (B.P. 391,508, 4.11.31).—Drying-oil-modified " glyptals " are made by heating a fatty oil with $>$ 15% of rosin and excess of glycerin until the mixture is homogeneous, and then condensing the product with phthalic anhydride or a polybasic acid. S. M.

Halogenated C_2H_2 polymerides. [Resins from] polymerised esters.—See III. **Pptd. $CaCO_3$.**—See VII.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Industrial uses of rubber latex. D. F. Twiss (Chem. and Ind., 1933, 410—416).—A review, covering the technical advantages of rubber latex, its modification for manufacturing purposes, methods of use, *e.g.*, by electrodeposition, dipping, moulding, and its application to the production of various types of article. In anodic deposition, coagulant positive ions play a considerable part. D. F. T.

Zinc oxide in rubber. II. Choice and testing of zinc oxide for rubber compounding. III. Manufacture of zinc oxide suitable for rubber compounding. H. A. Depew (Ind. Eng. Chem., 1933, 25, 532—538; cf. B., 1933, 480).—II. In testing the reinforcing qualities of ZnO a compounded rubber should be used which reduces variations in rate of vulcanisation to a min., *e.g.*, one containing mercaptobenzthiazole as accelerator and a relatively high proportion of S and fatty acid. In testing for differences in rate of vulcanisation a high S content and low accelerator content are desirable. For examination of activation qualities only 5—10% of ZnO should be used. If large proportions of acidic ZnO are to be used with alkaline accelerators the presence of 1·5% of $Ca(OH)_2$ is beneficial. Details are given for sampling and the determination of acidity, H_2O-sol. salts, material insol. in HCl, Pb, Cd, fatty acid (in surface-treated ZnO), particle size and shape, grit and purity, and intensity of colour.

III. A description is given of the production of ZnO from oxidised conc. ores by the American (Wetherill) process and from Zn by the French process. The particle size of the products can be reduced in various ways, *e.g.*, by applying a blast of air to the Zn flame or by diluting the vapour before combustion. Wet processes for the production of ZnO yield a non-uniform product, especially with respect to particle size; on account of quality and cost only the fume processes have so far been of commercial importance. D. F. T.

Conductivity of rubber heavily loaded with lampblack. J. Granier (Compt. rend., 1933, **196**, 1009—1011).—A mixing consisting of Madagascar rubber 1000 pts., lampblack 1000, mercaptobenzthiazole 15, ZnO 42, S 25 has indifferent mechanical properties, but a high inductive power for a.c., and is electronically conducting for d.c.; the conductivity is markedly increased by both extension or compression. Applications are suggested. C. A. S.

Production and vulcanisation of sponge rubber. H. Lindemann (Kautschuk, 1933, 9, 66—70).—The relative advantages and disadvantages attaching to the use of decomposable powders, compressed gases, and volatile liquids, respectively, as inflating agents are discussed. Two-stage vulcanisation, *i.e.*, partial vulcanisation under fluid pressure followed by completion after release of the pressure, is favourable to uniformity of structure in the product. The proper selection of vulcanising agent is important, as also is the correct adjustment of the time, temp., and pressure of vulcanisation, especially in the first stage. Even different supplies of so-called inert fillers may lead to serious divergence in the products. With improvement in procedure, *e.g.*, by avoiding the customary extreme mastication of the rubber, it is possible not only to effect economies, but also to obtain a sponge rubber of much enhanced quality. D. F. T.

Some difficulties in the manufacture of sponge rubber. G. L. Barron (India-Rubber J., 1933, **85**, 627—628).—Various difficulties encountered in the production of satisfactory rubber-sponge sheeting, using NH_4 carbonate as inflating agent, are described and remedies are indicated. D. F. T.

Oil-resistant rubber. E. Karsten (Kautschuk, 1933, 9, 73—74).—The numerous attempts to render rubber resistant to oil can be classified into those incorporating large proportions of fillers, oil-insol. colloids, *e.g.*, glue, or soaps, or those dependent on improved vulcanisation or on surface protection. The treatment is at best only partly effective and should be selected to suit the particular type of requirement. D. F. T.

Rubber antioxidants. III. F. Kirchhof (Kautschuk, 1933, 9, 70—72).—Smoked sheet and ordinary Ceylon crêpe rubber contain H_2O-sol. constituents capable of reducing ammoniacal $AgNO_3$, but destroyed by exposure to sunlight or ultra-violet light. Pale crêpe rubber (I) does not show this feature. Strips of (I) which had been immersed for 10 sec. in a 1% solution of various commercial antioxidants in C_6H_6 or $COMe_2$ possessed reducing power, but exhibited distinct differences in behaviour to the Ag reagent after irradiation. Unlike rubber, deresinated gutta shows no such reducing action until after exposure to light. D. F. T.

PATENTS.

Rubber-dispersing agent. R. G. SEAMAN, Assr. to NAUGATUCK CHEM. Co. (U.S.P. 1,867,633, 19.7.32. Appl., 27.8.30).—In forming an emulsion of rubber in a non-solvent, *e.g.*, H_2O, the "boil-off liquor" of the silk industry is used as a dispersing agent. D. F. T.

Forming threads or filaments from aqueous dispersions of rubber or the like. DUNLOP RUBBER Co., LTD., and E. A. MURPHY (B.P. 391,305, 9.4.32).—A modified jet box is described capable of obviating difficulties arising from any tendency to creaming or sedimentation on the part of the constituents of the dispersions. D. F. T.

Manufacture of rubber. DUNLOP RUBBER Co., LTD., D. F. TWISS, W. McCOWAN, and A. LAKEMAN (B.P. 391,309, 26.4. and 6.9.32).—Raw rubber is contacted with H_2O or an aq. solution of a H_2O-miscible liquid, *e.g.*, EtOH, so that some of the liquid is absorbed; alternatively, a fluid paste, suspension, or solution of powder such as an aq. slurry of $Ca(OH)_2$ may be applied instead of or after the aq. liquid. The material is then subjected to a dividing process, *e.g.*, by shearing. D. F. T.

Manufacture of rubber and like materials and compounds thereof. DUNLOP RUBBER Co., LTD., and D. F. TWISS (B.P. 391,854, 6.11.31).—"Mother stocks" are produced by converting plasticisers, antiagers, etc. into a fluid condition by heat and mixing with aq. dispersions of rubber etc. D. F. T.

Compounding of rubber. B. F. SCHWALM, Assr. to NEVILLE Co. (U.S.P. 1,869,172, 26.7.32. Appl., 24.7.30).—The dispersion of filling materials in rubber during compounding is facilitated by the addition of a mixture of a still residue from the acid purification of the lighter coal-tar oils and an oily coal-tar distillate, a suitable proportion being 2% on the rubber. D. F. T.

Compounding of rubber or like materials. DUNLOP RUBBER Co., LTD., and D. F. TWISS (B.P. 391,115, 14.10.31).—Rubber in the form of a solution or dough in org. solvent is compounded by incorporating aq. solutions or dispersions of the desired ingredients. D. F. T.

Manufacture of articles from rubber and rubber-like compositions. S. KAY & Co., LTD., and W. KAY (B.P. 391,511, 391,868, and 392,497, [A] 5.11.31 and 5.3.32, [B] 5.11.31 and 24.6.32, [C] 24.6.32).—(A) A stable mixture of an aq. dispersion of rubber, containing $\nless$ 0·5% of free alkali, with compounding ingredients is de-stabilised, *e.g.*, by the addition of an NH_4 salt and $ZnCO_3$, without causing any immediate thickening or coagulation. The mixture is then poured into moulds and when set the articles are removed washed, and dried. (B) In making a shoe or similar open, hollow rubber article, a sensitive mixture (I) containing a substantial proportion of a rubber dispersion is poured into a mould comprising a shell and core. After the mixture has gelled, with the aid of heat if desired, the article so formed is removed from the mould, dried, and vulcanised. (C) A moulded article with portions of different thickness is formed by pouring (I) into a mould and subjecting the latter to heating which, at least initially, is greater over the areas where the article is desired to be thicker. D. F. T.

Vulcanisation of rubber. G. H. STEVENS (U.S.P. 1,867,034, 12.7.32. Appl., 24.10.27).—A solid solution of diphenylguanidine in ditolylguanidine is used to accelerate vulcanisation. D. F. T.

Vulcanisation of rubber and similar materials. S. M. CADWELL, Assr. to NAUGATUCK CHEM. Co. (U.S.P. 1,871,038, 9.8.32. Appl., 27.11.31).—Dry-heat vulcanisation is effected by vulcanising in an atm. containing NH_3, the proportion of org. accelerator used being insufficient to effect proper vulcanisation in the absence of NH_3 and being substantially equal, if desired, to the proportion required for mould-curing similar stock. D. F. T.

Vulcanisation of rubber [articles]. C. J. RANDALL, Assr. to GOODYEAR'S INDIA RUBBER GLOVE MFG. Co. (U.S.P. 1,871,083, 9.8.32. Appl., 9.6.30).—In the vulcanisation of boots etc. on hollow lasts in a heated closed chamber (*A*), compressed air is introduced, *e.g.*, up to 19 lb. pressure, and air is withdrawn from the inside of the lasts. After a few min. the valves in the suction pipes are closed and NH_3 gas is introduced under pressure into *A* while the air pressure is maintained above atm. D. F. T.

Vulcanisation of rubber. RUBBER SERVICE LABS. Co., Assees. of R. L. SIBLEY (B.P. 391,122, 14.10.31. U.S., 23.10.30).—Vulcanisation is accelerated by a salt of guanidine (or a derivative thereof) with an org. acid, *e.g.*, by diphenylguanidine phthalate or acetate, in admixture with one or more other accelerators such as the reaction product of mercaptobenzthiazole (2 mols.) and phthalyl chloride (1 mol.). D. F. T.

Vulcanisation of rubber. R. L. SIBLEY, Assr. to RUBBER SERVICE LABS. Co. (U.S.P. 1,865,728, 5.7.32. Appl., 28.5.31).—Vulcanisation is accelerated by the condensation product of a mercaptoarylenethiazole, such as mercaptobenzthiazole, and the reaction product of an org. base, *e.g.*, a Schiff's base derived from MeCHO (3 mols.) and NH_2Ph (2 mols.), and an org. acid chloride such as phthalyl chloride. D. F. T.

Rubber accelerator [of vulcanisation]. C. J. ROMIEUX and L. J. CHRISTMANN, Assrs. to AMER. CYANAMID Co. (U.S.P. 1,867,631, 19.7.32. Appl., 30.12.31).—A compound of the probable structure $(RO)_2PS{\cdot}SH$, where R may be an aliphatic or aromatic radical, obtained, *e.g.*, by the action of P_2S_5 on BuOH or $C_5H_{11}{\cdot}OH$, is used, preferably together with a basic accelerator such as diphenylguanidine, to expedite vulcanisation. D. F. T.

Preservation of rubber. H. E. BOWERS, Assr. to B. F. GOODRICH Co. (U.S.P. 1,869,657, 2.8.32. Appl., 16.1.30).—Alkyl-substituted diarylnitrosoamines, *e.g.*, di-*p*-tolyl- or a tolylnaphthyl-nitrosoamine, retard the deterioration of rubber. D. F. T.

Reclaiming of vulcanised rubber. A. E. Barnard, Assr. to Dispersions Process, Inc. (U.S.P. 1,870,886, 9.8.32. Appl., 13.4.29).—Vulcanised rubber after being plasticised is formed into an aq. dispersion, the dispersion being subsequently flocculated by addition to a relatively large bulk of H_2O containing, if desired, a suitable metallic salt, *e.g.*, $Al_2(SO_4)_3$. The rubber ppt. is then collected, leaving H_2O-sol. impurities in the H_2O.

D. F. T.

[Antioxidant] treatment of rubber. W. P. ter Horst, Assr. to Naugatuck Chem. Co. (U.S.P. 1,870,880, 9.8.32. Appl., 29.7.30).—The product of reaction of a phenol, a primary arylamine, and an aliphatic or alicyclic ketone in a single-stage operation, *e.g.*, from β-$C_{10}H_7\cdot OH$, NH_2Ph, and $COMe_2$, is used as an antioxidant. D. F. T.

Treatment of rubber [for preservation]. L. H. Howland, Assr. to Naugatuck Chem. Co. (U.S.P. 1,868,145, 19.7.32. Appl., 31.3.30).—An aminoacridine, preferably one with H attached to the 5-C atom and with NH_2 attached to each C_6H_6 nucleus, *e.g.*, 2 : 8-diamino-3 : 7-dimethylacridine, is used as antioxidant.

D. F. T.

Rubber-vulcanisation process [and age-resisting product]. W. Scott, Assr. to Rubber Service Labs. Co. (U.S.P. 1,869,624, 2.8.32. Appl., 24.1.29).—The reaction product of a ketone containing the grouping COMe and a naphthylamine, especially of $COMe_2$ and α-$C_{10}H_7\cdot NH_2$, is incorporated, prior to vulcanisation, for antioxidant purposes. D. F. T.

Rubber substitute. K. A. Gillespie, Assr. to Stamford Rubber Supply Co. (U.S.P. 1,869,557, 2.8.32. Appl., 7.3.29).—A white rubber factice is made by mixing non-mineral oil, *e.g.*, rape-seed oil (100 pts.), a low-temp. vulcanising agent, *e.g.*, S_2Cl_2 (20 pts.), a stabilising agent, *e.g.*, MgO (5 pts.), and an NH_4 salt, *e.g.*, NH_4HCO_3 (10 pts.), and maintaining the temp. below that at which NH_3 is materially generated, until vulcanisation is complete. D. F. T.

(a) **Cementing of rubber to metal.** (b) **Production of rubber cement.** R. M. Warner, Assr. to Miller Rubber Co., Inc. (U.S.P. 1,869,636 and 1,869,638, 2.8.32. Appl., [a] 29.5.28, [b] 20.4.29).—(a) A coat of solution of brominated rubber, in which the proportion of Br is $\frac{1}{8}$—$\frac{1}{4}$ of that required to saturate the rubber, is first applied to the metal; the rubber sheet is then applied and vulcanised in position. (b) An effective adhesive for rubber to metal, glass, or wood comprises a solution of partly brominated rubber obtained, *e.g.*, by treating 136 pts. of crude rubber in C_6H_6 with 40—80 pts. of Br. D. F. T.

Synthetic rubber.—See III. **Coating compositions from rubber.**—See XIII.

XV.—LEATHER; GLUE.

Determination of dextrin in presence of glue. J. Alexander (Ind. Eng. Chem. [Anal.], 1933, **5**, 200).—The mixture is hydrolysed slowly with dil. HCl at 60°, the solution is neutralised, and the glucose determined by Benedict's method. The glucose val. is converted by the factor 0·9 into the amount of dextrin in the sample. E. S. H.

Patent.

Manufacture of [vegetable] glue. I. F. Laucks and G. Davidson, Assrs. to I. F. Laucks, Inc. (U.S.P. 1,871,329, 9.8.32. Appl., 4.10.28).—A mixture of, *e.g.*, 100 pts. of soya-bean flour with 10—20 pts. of $Ca(OH)_2$ is worked up to a paste with NaOH solution.

L. A. C.

XVI.—AGRICULTURE.

Classification of soils on the basis of the composition of their colloid fractions. I. Isolation of the colloid fraction by cataphoresis. A. Reifenberg and S. Adler. **II. Classification of American soils.** A. Reifenberg (Z. Pflanz. Düng., 1933, **29**, A, 150—155, 155—162).—I. The SiO_2 : sesquioxide ratio of the colloid fraction is characteristic for each of the well-defined soil types. Similar vals. are obtained by separating the colloid by cataphoresis or by centrifugal methods.

II. A direct negative relationship is demonstrated between the SiO_2 : sesquioxide ratio of the colloids in American soils and the corresponding vals. for average annual rainfall. The influence of temp. on the $SiO_2 : R_2O_3$ ratio is less definite, the general tendency being towards a positive correlation in arid, and negative in humid, areas. A. G. P.

Soil profile studies of Romney Marsh pastures. J. K. Dubey (J. Min. Agric., 1933, **40**, 131—140).—Profile characteristics and monoliths are recorded. Other conditions being equal, pasture fertility varies with the depth of the upper horizon. Heavy-textured surface soils are less fertile than the lighter ones. With similar surface soils, heavy subsoils, especially the lowest layer, adversely affect pasture fertility. In soils of similar formation fertility is controlled by the height of the H_2O-table. A. G. P.

Cohesion and viscosity of clays. E. G. Richardson (J. Agric. Sci., 1933, **23**, 176—184).—A hot-wire viscosimeter is described and its use in examining the flow of clay pastes recorded. A. G. P.

Cohesion forces in soils. E. N. Fox (Kolloid-Z., 1933, **63**, 226—228).—A reply to Pokrovski (B., 1932, 905). F. L. U.

Lysimeter studies. III. Movement and translocation of nitrogen and organic constitutents in the profile of a podsolic soil. J. S. Joffe (Soil Sci., 1933, **35**, 401—411; cf. B., 1933, 401).—Losses of total N from forest soils are small (3—3·2 lb. N per acre per annum). Of the total N in leachings only 50—75% was in the form of NO_3' from the A_1 horizon and still less from the A_2 horizon. The org. matter in the leachings from individual horizons varies little from year to year, but there is a marked difference between that from A_1 and from A_2. The C : N ratio of org. matter leached from A_1 is high and from A_2 low. Appreciable amounts of NO_3' are retained in the *B* horizon. A. G. P.

Agricultural value of the important Dutch soils. P. Vageler and F. Alten (Z. Pflanz. Düng., 1933, **29**, A, 65—116).—Chemical and physical data of the various types of Dutch soils are recorded and a general system of soil examination for ascertaining fertiliser requirements is discussed. A. G. P.

Acid soils of the Lardarello zone. E. Alinari (Annali Chim. Appl., 1933, **23**, 173—188).—The active acidity, exchange acidity, and hydrolytic acidity of soils and their agronomic significance are discussed. Of 12 poor, almost sterile, soils from the boraciferous soffioni district of Lardarello, 11 were devoid of $CaCO_3$ and the other contained only a small proportion, whilst the p_H vals. were 4·4—5·6 in 10 cases, and 6·9 and 7·4 in the other two. The CaO adsorption of certain of these soils was measured by Hissink's method, and pot experiments show that they can be rendered fertile by suitable liming and manuring. T. H. P.

Soil examination in the sugar [beet] industry. L. Matischek (Z. Zuckerind. Czechoslov., 1933, **57**, 313—316).—A simplified system of soil analysis is described. As an index of mechanical condition, sand is determined by an elutriation method, using a const. head of H_2O. The p_H val. of a KCl extract is determined colorimetrically, and the CaO status is judged by the hydrolytic acidity (Kappen). The P and K requirements are determined by the Dirks and Scheffer method. A. G. P.

Significance of certain "single-value" soil constants. E. W. Russell (J. Agric. Sci., 1933, **23**, 261—310).—Interrelationships are examined between the base-exchange capacity, sticky-point H_2O, clay content, and a no. of soil-H_2O consts. A. G. P.

Electrodialysis applied to soils. S. Odén and T. Wijkström (Medd. centralanst. forsöks. jordbruks., No. 392. Aveldn. lantbrukskem., 1931, No. 42; Bied. Zentr., 1933, **A**, **3**, 201—202).—Apparatus is described for examination of soils under controlled conditions. Prolonged electrodialysis (100—200 hr.) caused a movement of Al and SiO_2 to the cathode and Si to the anode. The p_H remained const. and there was little free alkali. In all soils the removal of exchangeable bases, and also the absorption of ions by the $H^{\cdot}$-saturated soils, was in the order $Ca^{\cdot\cdot} > Mg^{\cdot\cdot} > K^{\cdot} > Na^{\cdot}$. When oat plants were placed in a fully electrodialysed soil there was a transition of ions from the plant to the soil. The movement of bases into plant roots was in the order $Na > K > Mg > Ca$ and into the aërial portions of plants, $K > Na > Mg > Ca$. A. G. P.

Soluble sesquioxides and organic matter from alkali treatment on soils. G. T. Shaw and R. R. McKibbin (Science, 1933, **77**, 411—412).—Liming of podsol soils does not produce the large increases in sol. Fe and org. matter obtained with acid Louisiana soils, but equiv. treatment with NaOH and Na_2CO_3 gives a marked increase of sol. org. matter colloidally suspended in the soil solution. Fe (40 p.p.m. of soil) and Al (20 p.p.m.) are adsorbed by this org. material. L. S. T.

Effects of soil reaction. F. Münter (Landw. Woch., 1931, **89**, 552—554; Bied. Zentr., 1933, **A**, **3**, 193).—The influence of various fertilisers on soils of varying p_H is recorded. The Ca present in certain N fertilisers and in basic slag and Rhenania phosphate is insufficient to have any appreciable effect on soil reaction. In soils of different type but similar p_H plant injury due to acidity varied considerably in extent. On acid soils cultivated plants were frequently unable to form nutrient-assimilating roots. The starch content of potatoes on acid soils was increased by applications of CaO. A. G. P.

Influence of rain on soil reaction. A. Salminen (Suomen Kem., 1933, **6**, **B**, 60).—Rainfall under warm summer conditions increased the p_H of soil at all depths to 25 cm. Later in the season on well-manured soil the effect was reversed. A. G. P.

Titanium in Moravian soils. I. B. Malač (Mitt. Tschech. Akad. Landw., 1931, **7**, Nos. 6—7; Bied. Zentr., 1933, **A**, **3**, 203—204).—Ti in soils is determined best by the volumetric method of Neumann and Murphy or by Weller's colorimetric method. The Ti content of all soils examined was from 0·5 to 1·0%. The vertical translocation of Ti in soil profiles is established. A. G. P.

Limits of use of the seedling method [for determining soil-nutrient values]. A. Hock (Superphosphat, 1932, **8**, 215—217).—Differences in growth and rooting systems of barley due to variations in soil reaction and org.-matter contents are demonstrated. A. G. P.

Biological absorption of mineral nitrogen in the soil. A. T. Kalachikov (Chem. Social. Agric., 1932, **1**, No. 3—4, 35—44).—Addition of starch caused a rapid decrease in NO_3' in chernozem and disappearance of NO_3' in degraded chernozem. NO_2' was decreased by 40·8 and 76%, respectively. The amount of absorbed NH_4 increased from 15 to 51% in 3 months; acidity was unchanged. N of $Ca(NO_3)_2$ and $(NH_4)_2SO_4$ added simultaneously with starch was converted into microbial cell-N. Ch. Abs.

Adsorption of phosphoric acid by soil. A. T. Kirsanov (Chem. Social. Agric., 1932, **1**, No. 3—4, 27—34).—Podsol and chernozem soils were classified as (1) those which have an abundant supply of available P_2O_5, (2) those which absorb a large quantity and make it unavailable, (3) those which absorb added P_2O_5 but do not lower the availability. Soils of (2) are analysed by extraction with 0·05*N*-HCl. If the soil has a high humus content its absorptive capacity for P_2O_5 from acid solution is not an indication of its belonging to group (2). Ch. Abs.

Physico-chemical relationships of soil phosphates. T. F. Buehrer (Arizona Agric. Exp. Sta. Tech. Bull., 1932, No. 42, 155—212).—A theoretical discussion of the PO_4''' equilibrium in soils is presented. In calcareous soils the equilibrium is largely controlled by $CaHPO_4$ derived from the surface hydrolysis of carbonate-apatite. Within the p_H range of optimum absorption by plants H_2PO_4' predominates. Under conditions such that this ion is not present the necessary conversion is made by exudation of CO_2 from plant roots. The mobilities of H_2PO_4' and HPO_4'' are approx. the same, and availability cannot be judged in terms of mobility alone. Equilibrium conditions in the system $CaHPO_4$–$CaCO_3$–H_2CO_3 are examined and the effect of neutral salt concn. is calc. The passage of PO_4''' through root membranes is discussed as an electrical mechanism based on the amphoteric character of the proteins in the membrane. A. G. P.

Iron, aluminium, and organic phosphates and phosphate fixation in calcareous soils. W. T.

McGeorge and J. F. Brezeale (Arizona Agric. Exp. Sta. Tech. Bull., 1932, No. 40, 59—111).—Normal phosphates of Fe and Al yield solutions of higher [PO_4'''] than occur in soil solutions and are readily available to plants. Mineral phosphates of Fe and Al [except vivianite (I)] are insol. both in CO_2-free and in CO_2-saturated H_2O, and are only very slightly dissociated when subjected to electrodialysis. Wheat plants did not absorb any P from lazulite, wavellite, or dufrenite, but did so readily from (I) in CO_2-free cultures. In cultures prepared with H_2O 25% saturated with CO_2 absorption from (I) was much increased, but on other minerals there was little or no effect. Within the p_H range 5·0—9·0 max. absorption from (I) occurred at p_H 5·0. Dissociation of Ca phosphates during electrodialysis is greatly reduced by the presence of $CaCO_3$. Solubility of Ca phosphates is greatest in acid conditions and that of Fe and Al phosphates and of phytin in alkaline conditions. In calcareous soils Fe and Al phosphates revert to extremely insol. forms, but in alkali soils an appreciable solubility is maintained. In the presence of Na silicate PO_4''' solubility remains relatively high irrespective of the presence or absence of CO_2. Solubility in the presence of Na aluminate is reduced by CO_2. PO_4''' fixed by Fe or Al hydroxide does not pass into solution during electrodialysis, but that fixed by colloidal SiO_2 readily redissolves. A. G. P.

Nature of phosphate fixation in soils. M. C. Ford (J. Amer. Soc. Agron., 1933, **25**, 134—144).—The proportion of P fixed by soils from H_3PO_4 solutions is paralleled by the quantity of $Ca(OH)_2$ required to be added to soil in order completely to prevent any fixation. Goethite (I) (limonite) fixed P in a form insol. in H_2SO_4 of p_H 3·0. No fixation occurred with hæmatite (II). The solubility of P fixed by bauxite (III) was of an intermediate order. The formation of (II) from (I) by heating was accompanied by complete elimination of P-fixing power. Partial dehydration of (III) increased its ability to fix P. Further dehydration reduced but did not entirely destroy this property. The phosphates formed with (I) and (III) were cryst. Prolonged heating of soils at 185° reduced their P-fixing capacities to varying extents. This may be due to dehydration of (I) in soils. That prolonged heating at 260° does not destroy the power of P fixation in many soils is ascribed to their (III) contents. P fixed by soils as Ca or Mg phosphates is readily sol. in weak solvents ; that fixed by Fe or Al hydroxide, chloride, or sulphate is, in part, easily hydrolysable and available to plants, but that fixed by (I) is very insol. and only slowly becomes available. A. G. P.

Reactions of superphosphate in soil. A. Sanfourche and J. Henry (Compt. rend. Acad. Agric., France, 1933, **19**, 33—44).—At temp. up to 35° the reaction between pure $Ca(H_2PO_4)_2$ and $CaCO_3$ ceases with the formation of $CaHPO_4$ and is complete only in presence of a large excess of $CaCO_3$ and with prolonged agitation. No $Ca_3(PO_4)_2$ is formed at $< 35°$. In presence of soil, the formation of $CaHPO_4$ is still further retarded and except in calcareous soils was $\ngtr$ 55% of the theoretical quantity. With superphosphate the reaction does not proceed to $>$ 5—6% even with heavy excess of $CaCO_3$. This is ascribed to the presence of a colloidal ferrophosphate complex (cf. A., 1933, 40) which coats and protects from reaction the granules of $CaCO_3$. Superphosphate in soil undergoes little decomp. but is adsorbed by the soil colloids. A. G. P.

Rapid chemical methods for determining the capacity of the soil to supply phosphoric acid to plants. G. S. Fraps and J. F. Fudge (J. Amer. Soc. Agron., 1933, **25**, 217—230).—Comparison is made of a no. of recognised methods with field- and pot-culture tests. Truog's colorimetric method (B., 1931, 266) gave lower vals. than methods using $0·2N$-HNO_3 for extraction or the colorimetric citric acid process. Bray's " Hi-lo-fosfate " method (B., 1930, 295) was somewhat erratic and, for field work, the Truog–La Motte method is preferable. In all colorimetric processes errors introduced by slight contamination of reagents or apparatus may be considerable. A. G. P.

Determination of the annual available amounts of potassium and other nutrients in soil. I. K. Pfeilsticker (Z. Pflanz. Düng., 1933, **29**, A, 162—180).—The importance of a consideration of the rate of replenishment of assimilable plant nutrients in soils during plant growth is discussed. In Ca-rich soils supplies of K are maintained by displacement of adsorbed K by Ca. Modifications of the Wrangell extraction method for determining the available nutrient reserve in soils are examined. A. G. P.

Determination of nitrate in soils. A. Němec and A. Koppová (Z. Pflanz. Düng., 1933, **29**, A, 182—185).—In the $C_6H_3(OH)(SO_3H)_2$ method, clarification of the soil extract with $Al(OH)_3$ leads to higher recorded vals. than when CaO is used. Presence of Cl′ in the extract leads to loss of N during analysis. The xylenol method (B., 1929, 370) avoids this error by removal of Cl during the pretreatment with $KMnO_4$. In soils poor in NO_3', oxidation of NO_2' and NH_2-acids may cause unduly high vals. by this method. A. G. P.

Rapid methods of examining soils. II. Use of *p*-nitrophenol for assessing lime status. III. Use of potassium dihydrogen phosphate in studying base-exchange capacity. R. K. Schofield (J. Agric. Sci., 1933, **23**, 252—254, 255—260 ; cf. B., 1932, 275).—II. An appropriate proportion of soil is added to 40 c.c. of $0·04N$-$Ca(OH)_2$ containing 8·34 g. of *p*-nitrophenol (I) per litre. The mixture is shaken overnight, filtered, and an aliquot titrated (cresol-green) with $0·05N$-HCl. The difference between this titre and that of the original (I) solution is equiv. to the Ca absorbed by the soil. Best results are obtained by use of a wt. of soil such as will leave the final solution approx. half-neutralised.

III. The reduction in electrical conductivity of a mixed solution of 2 vols. of $0·15M$-K_2HPO_4 and 1 vol. of $0·15M$-KH_2PO_4, resulting from contact with the soil sample, is a measure of the K taken up by the soil and indicates its base-exchange capacity at p_H 7·0. A. G. P.

Action of magnesium ions on calcium-deficient mineral soils. L. Schmitt (Z. Pflanz. Düng., 1933, **29**, A, 50—58).—The superiority of kainit (I) (containing $MgSO_4$) over other K fertilisers in carbonate-free soils is examined. Plants assimilate Mg phosphates more readily than superphosphate. Application of $MgSO_4$ to soil did not increase the citric-sol. or root-assimilable PO_4''' supplied as superphosphate or $AlPO_4$. The action of (I) is not directly related to the degree of saturation of the soil with Ca. Current views on the effects of (I) on crops are discussed. A. G. P.

Absorption experiments with sawdust. J. Kisser and K. Lettmayr (Z. Pflanz. Düng., 1933, **29**, A, 189—195).—In view of the suggested use of sawdust in modified Neubauer tests of soils the absorption of Cu, Ag, Zn, Mn, Pb, Mg, and Sn by hornbeam sawdust is examined. Of the constituents of the wood only the pectinous materials are actively absorbent. A. G. P.

Decomposition of certain types of forest litter under field conditions. J. G. Falconer, J. W. Wright, and H. W. Beall (Amer. J. Bot., 1933, **20**, 196—203).—Pine-forest litter decomposes more rapidly than do accumulations of bracken stems. Raised temp. and increased rainfall favour decomp. A. G. P.

Phosphate requirement of Brunswick soils, based on results of Neubauer analyses. A. Gehring (Die Phosphorsäure, 1931, **5**, 298—309; Bied. Zentr., 1933, A, **3**, 192).—Differences in the assimilable-PO_4''' contents of these soils are traced to geological, climatic, or cultural factors. In general, the PO_4''' requirement decreases as the CaO status improves. A. G. P.

[Soil] solubility and mobility of the phosphoric acid of basic slag. A. A. Kalushski (Udobr. Urozhai, 1931, **3**, 718—724: Bied. Zentr., 1933, A, **3**, 243—244).—No acid is utilised during the dissolution of basic slag in soil. As a top-dressing slag was almost as efficient as superphosphate. The solubility of slag in aq. suspensions of soil was low in P-deficient soils (due to fixation by soil) and high in soils rich in PO_4'''. A. G. P.

Effect of small amounts of superphosphate on the growth of plants receiving phosphorite as a fertiliser. M. Ostrowska and J. Menciński (Rocz. nauk. Roln. Lesnych, 1931, **26**, 297—310; Bied. Zentr., 1933, A, **3**, 241—242).—On soils treated with phosphorite, small amounts of superphosphate drilled immediately beneath the seeds produced heavier yields than would be anticipated from considerations of the effects of the two P fertilisers separately. Such treatment accelerated growth and maturity, increased the P_2O_5 content of the plants and the N content of the grain, narrowed the grain: straw ratio, but did not affect the P : N ratio of the grain. A. G. P.

Mobilisation of the phosphoric acid of phosphorite and of soils by the roots of lupins and other plants. M. Domontovitsch and V. Polossin (Ergeb. Veg. Lab.-arb. Prianischnikov, 1931, **15**, 103—112; Bied. Zentr., 1933, A, **3**, 227).—In sand treated with phosphorite oats made better growth when intersown with lupins. Growth of lupins increases soil acidity and favours dissolution of PO_4'''. A. G. P.

Action of frost on the dissolution of phosphate and potassium [in soils] as shown by Neubauer tests. B. Bätz (Diss., Halle; Bied. Zentr., 1933, A, **3**, 210).—Frost does not increase the solubility of K˙ or PO_4''' in soils except in the case of certain K-bearing silicates. Better utilisation of existing supplies may result if the breakdown of minerals causes a notable increase of the total surface area of the soil particles. A. G. P.

Transformation of ammonium nitrate and urea in soils. H. Engel and A. Kaufmann (Z. Pflanz. Düng., 1933, **29**, A, 1—15).—Nitrification of NH_4NO_3 (I) in an uncropped and poorly buffered soil caused a marked increase in acidity. In cropped soils during intake by plants (I) was physiologically acid, the NH_3 being more rapidly assimilated than NO_3'. Following the period of active intake the soil p_H tended to return to its initial val. In uncropped soils the nitrification of urea involved considerable losses of N, probably due to the intermediate formation of urea nitrite. The acidity developed in the soil was correspondingly $<$ in the case of (I), and in cropped soils tended to disappear in the period following the rapid growth of the plants. A. G. P.

Transformation of ammonium sulphate in soil. H. Engel and A. Kaufmann (Z. Pflanz. Düng., 1933, **29**, A, 16—24).—Soil acidity developed by the use of $(NH_4)_2SO_4$ was much smaller in cropped than in uncropped soils. The nitrification process leaves no permanent effect on soil acidity. The CaO required to counteract the effect of the SO_4'' is 1·5—2·0 times the equiv. proportion. A. G. P.

Influence of crop-residue decay on soil nitrates. A. L. Patrick (Soil Sci., 1933, **35**, 335—354).—Root residues from maize, red clover, and timothy were small at soil depths $>$ 7 in. Admixture of ground timothy residues to soil reduced the NO_3' content of the latter in proportion to the amounts of residue used. Clover residues caused a temporary reduction in soil NO_3'. Maize residues affected NO_3' accumulation only when added to soil in amounts $>$ those obtaining in normal cropping practice. During decomp. of residues in soil, CO_2 formation is closely related to NO_3' depression. Aq. extracts of timothy residues produced greater NO_3' depression in soils than did those of clover. In general, the proportion of H_2O-sol. org. matter in residues largely influenced the extent of NO_3' depression in soil. A. G. P.

Mobility of nutrients in the soil in relation to its cultural condition. N. S. Avdonin (Chem. Social. Agric., 1932, **1**, No. 2, 47—61).—In sod chernozem soils the nutrients are immobile. After a legume crop the soil is lacking in P and enriched with N; Ca from the lower horizon immobilises much P. Nutrients attain their highest mobility under fallow, and the losses of artificial fertilisers are considerable. Ch. Abs.

Changes in volume occurring when dry soils are wetted with water and with chemical solutions. G. Bouyoucos (J. Amer. Soc. Agron., 1933, **25**, 129—133).—Dilatometer measurements show the vol. of an oven-dried soil moistened with H_2O or salt solution to be $<$ the sum of the original vols. of soil and liquid. The net contraction is relatively great in clays and humus soils. In any given soil, H_2O and *N*-solutions of neutral salts produce the same decrease in vol., which is much $>$ that produced by KOH solutions. A. G. P.

Influence of fertilisers on the adsorptive complex of soils. A. L. Pjatenko (Arb. Versuchs-stat.

Mironowka, 1931, **9**, 1—31; Bied. Zentr., 1932, **3**, **A**, 21—22).—Systematic use of $(NH_4)_2SO_4$, superphosphate, and K salts reduced the adsorption coeff. of a black-earth soil by 17%. The use of dung tended to increase to some extent the proportion of adsorbed bases. Variations in adsorbed base content and active acidity during one growing season were small. Changes in the adsorptive complex were reflected more exactly by the hydrolytic than by the exchange acidity. Changes in soil structure resulting from the use of artificial fertilisers were insufficient to influence crop yields. A. G. P.

Nitrogen fertilisers and the culture of vines. M. A. Zacharewicz (Compt. rend. Acad. Agric., France, 1933, **19**, 157—163).—Among the principal N fertilisers examined $Ca(NO_3)_2$ proved the most effective. A. G. P.

Nitrogen manuring of legumes. Burgevin (Compt. rend. Acad. Agric., France, 1933, **19**, 186—190).—Symbiotic fixation of N by nodule organisms is not markedly affected under normal soil conditions by application of N fertilisers. A. G. P.

Nitrogen fertilisers and the presence and development of *Azotobacter chroococcum* in soils. E. Schneider (Diss., Munich, 1931; Bied. Zentr., 1932, **3**, **A**, 29).—The favourable effect of N fertilisers in the growth of *Azotobacter* is most marked in the case of $NaNO_3$ and $Ca(NO_3)_2$. Urea is less active in this respect. The influence of $(NH_4)_2SO_4$ (I) is exerted only after nitrification. Repeated applications of (I) tend to reduce the activity of this organism. A. G. P.

Influence of unbalanced manuring on nitrification in soils. H. Bucherer (Diss., Munich, 1930; Bied. Zentr., 1932, **3**, **A**, 30).—Repeated use of N fertilisers favoured nitrification and increased the soil population of bacteria concerned. A temporary retardation occurs immediately after applications of $(NH_4)_2SO_4$, but disappears as nitrification proceeds. A. G. P.

Influence of method of irrigation on the nutrient status of soil and yield of cotton. F. Geltzer (Arb. Allruss. Forschungsinst. f. Baumwollbau [Taschkent], 1931, **43**, 34; Bied. Zentr., 1932, **3**, **A**, 39—40. Cf. B., 1932, 1046).—Infiltration methods are preferable to surface flooding since soil structure is less impaired, permeability of soil is greater, and the enrichment with CO_2 of air immediately above the soil surface is considerable. Poorer nitrate accumulation after flooding is ascribed to the lowered activity of the organisms and to denitrification. A. G. P.

Nitrification of stall manure in arable soil. VIII. C. Barthel and N. Bengtsson (Medd. Centralanst. försöks. jordbruks., 1931, No. 400; Bied. Zentr., 1932, **3**, **A**, 31. Cf. B., 1932, 317).—The nitrification of cattle manure made with peat and with straw litter is compared. NH_3-N was more rapidly nitrified in peat since its carbohydrate constituents were less easily decomposed and the locking-up of N by the organisms was restricted. The higher NH_3 content of the peat manure is ascribed to its higher acidity and greater absorptive power. The decomp. of peat cellulose was relatively slow. A. G. P.

Comparative absorption [by plants] of ammoniacal and nitrate-nitrogen in the absence of nitrification. C. Brioux and E. Jouis (Compt. rend. Acad. Agric., France, 1933, **19**, 332—336).—Dry-matter yields of maize in pot cultures were greater from $NaNO_3$ that from $(NH_4)_2SO_4$, notable differences occurring in root development. Assimilation of NH_3-N was almost as rapid as that of NO_3-N and in both cases there was a similar % of N in the dry matter. A. G. P.

Utilisation of phosphate and potash fertilisers on degraded chernozem soils. G. Maslov (Arb. Landw. Versuchs-stat. Kiev, 1930, No. 64, 81—104; Bied. Zentr., 1932, **3**, **A**, 72).—The beneficial effect of a previous leguminous crop persisted after one growth period. Phosphorite had little action on the immediate crop, but its after-effect on the following sugar-beet crop was considerable. Among artificial P fertilisers, "double" superphosphate was the most effective on both acid and alkaline soils. Its use in conjunction with other alkaline fertilisers reduced the efficiency of basic slag. Bone meal gave best results when applied with alkaline materials. A. G. P.

Conditions influencing the action of potash fertilisers on podsols. D. V. Druzhinin (Ergeb. Veg. Lab.-arb. Prianischnikov, 1930, **15**, 273—340; Bied. Zentr., 1933, **A**, **3**, 204—205).—In soils not saturated with bases, application of large quantities of low-grade K salts may cause plant injury. In podsols having no exchange acidity this effect is counteracted by the presence of mobile $Ca^{\cdot\cdot}$. In the p_H range 5·0—5·5 red clover benefits more by the presence of $Ca^{\cdot\cdot}$ than by the correction of the acidity. Peat effectively regulates the reaction and proportion of mobile $Ca^{\cdot\cdot}$ in sandy soils. A. G. P.

Field experiments with sugar cane, 1931—1932. C. H. B. Williams and R. R. Follett-Smith (Brit. Guiana Dept. Agric. Sugar Bull., 1933, No. 1, 102 pp.).—Effects of manuring and soil drainage are examined. A. G. P.

Nutrition of higher plants with organic compounds. I. Tanaka (Jap. J. Bot., 1931, **5**, 323, 350; Bied. Zentr., 1932, **3**, **A**, 43—44).—For a no. of plants examined, NO_3' proved the best source of N. Urea was assimilated readily, and asparagine, acetamide, or glycine to a limited extent. *Sisyrinchium* utilised sucrose, maltose (I), lactose, glucose (II), fructose, and galactose (III), but not mannose (IV). (I), (III), and (IV) had an inhibitory action on *Plantago*. Assimilation of (II) could not replace the photosynthetic process. Org. acids (butyric, salicylic) were tolerated only in small concn. HCO_2H and AcOH retarded root development. Lecithin was more easily assimilated than phytin. Among a no. of org. compounds examined as sources of S only cystine proved at all utilisable. A. G. P.

Soil mulching with various artificial materials. J. Reinhold and M. Schmidt (Z. Pflanz. Düng., 1933, **12**, **B**, 203—241).—Results of trials with mulching paper impregnated with nutrients, peat, straw, etc. are recorded and the effects on soil temp. and "respiration," crop yields, and weed growth are discussed. A. G. P.

Movement of fertilisers in Carrington loam. O. E. Overseth (J. Amer. Soc. Agron., 1933, **25**, 202—216).—The downward movement of N fertilisers in soils was more rapid than that of K fertilisers. Movement of PO_4''' was rapid during 48 hr. after application, but was subsequently retarded. $(NH_4)_2SO_4$ (I) tended to retard the movement of superphosphate and *vice versa.* Reversion of superphosphate was rapid, and 21 days after application 80% of the $Ca(H_2PO_4)_2$ added was transformed into $CaHPO_4$ and a considerable proportion of the remainder into $Ca_3(PO_4)_2$. (I) did not influence the movement of K salts, nor did KCl affect that of N or PO_4'''. Application of KCl + (I) facilitated the movement of PO_4'''. Conductivity measurements indicate diffusion of sol. salts in the immediate vicinity of the fertiliser within 2 hr. of application, but at 2—3 in. depth no movement was apparent in 150 hr. A. G. P.

***Aspergillus niger* as an indicator of manurial requirement.** J. STOCK (Bot. Archiv., 1933, **35**, 1—76).—The growth of *A. niger* does not give an accurate reflection of the nutrient val. of soils. In the customary test method, sterilisation of the soil medium prior to inoculation effects changes in the assimilability of nutrients. The yield of mycelium is affected by the amount of the inoculum and the method of drying the product. The presence of Fe salts influences the yield-increase produced by PO_4''', and the extent of sporulation varies with the amount of PO_4''' present. Toxic effects due to presence of urea in the medium are indicated. The period of max. mycelium production varies with the level of nutrition, and the rate of decrease in wt. subsequent to the max. is considerable. In the comparative examination of soils it is therefore impossible to fix an equable period of growth. A. G. P.

Effect of culture solutions on growth and nitrogen fractions of oat plants at different stages of their development. A. C. SESSIONS and J. W. SHIVE (Soil Sci., 1933, **35**, 355—374).—In the early stages oats grew equally well in nutrient solutions of high NO_3' and in those of high $NH_4^{\cdot}$ contents. With advancing maturity NO_3' produced more rapid growth. The NH_3-N contents of the plants varied with the $[NH_4^{\cdot}]$ of the nutrient. Plants from high-$NH_4^{\cdot}$ nutrients were characterised by low dry-matter yields and a higher % of NH_3-N in older than in younger plants. The NO_3-N in plants was related to the $[NO_3']$ of the nutrient. Plants having high proportions of sol. org. N also had high NH_3-N contents and were produced in nutrients having a relatively large proportion of $NH_4^{\cdot}$ to NO_3'. The insol. org. N content of plants was influenced by the composition of the nutrient to a less extent than any other N fraction, but varied considerably with age. Nutrients containing much NH_3-N produced plants with high total org. and low inorg. N, whereas high-NO_3' media yielded plants with high inorg. and low org. N fractions. The total N of plants varied with but was not directly proportional to the total N content of the nutrient. A. G. P.

Nitrogen absorption from culture solutions. I. Oats. A. L. STAHL and J. W. SHIVE (Soil Sci., 1933, **35**, 375—399).—Culture solutions contained approx. equal proportions of N as $NH_4^{\cdot}$ and NO_3'. The rate of absorption of $NH_4^{\cdot}$ is at a max. at initial growth, declining to a min. at or approaching maturity. NO_3' absorption is minimal in the early stages, rising to a max. at the flowering stage and declining to a second min. as maturity is reached. At no time during active growth does the absorption of $NH_4^{\cdot}$ and NO_3' cease. The max. rate of absorption of $NH_4^{\cdot}$ is $>$ double that of NO_3'. The total N absorbed per culture per hr. is a max. at the flowering period, but the total N absorbed per unit dry tissue per hr. attains a max. corresponding with the max. $NH_4^{\cdot}$ intake, by which it is controlled, and a secondary max. corresponding with, and determined by, the max. NO_3' intake. A. G. P.

Mechanical application of fertilisers to cotton in S. Carolina in 1931. G. A. CUMINGS, A. L. MEHRING, J. J. SKINNER, and W. H. SACHS (U.S. Dept. Agric. Circ., 1933, No. 264, 32 pp.).—Injury to germinating seeds due to drilling of fertilisers in close proximity is examined. Lateral movement of sol. salts into the seed zone was insignificant, but vertical movement was considerable and liable to cause serious injury. Germination reached a max. when the concn. of the soil solution in contact with seeds was 0·05—0·2% and ceased when the val. rose to 3%. A. G. P.

Behaviour of flax towards liming on podsols. D. V. DRUZHININ (Ergeb. Veg. Lab.-arb. Prianischnikov, 1930, **15**, 173—212; Bied. Zentr., 1933, A, **3**, 244).—On soils saturated with bases, additions of even small amounts of CaO may cause injury to flax. Where the quantity of CaO used is $\ngtr$ the hydrolytic acidity, increased yields of fibre due to liming occur only on soils exhibiting considerable exchange acidity. On such soils liming is particularly effective in cases where base absorption is small. Applications of CaO in excess of the hydrolytic acidity adversely affect the yield of fibre. Presence of excess of $CaCO_3$ at, and subsequent to, the flowering period leads to exchange reactions between K and Ca and causes abnormal development of the flax. A. G. P.

Effect of seed inoculation and of a nitrogen fertiliser on the survival of red clover plants growing in soil previously treated with sodium chlorate. W. E. HAINES (J. Amer. Soc. Agron., 1933, **25**, 181—183).—On chlorate-treated soils the survival of clover with different after-treatments was in the order: no further treatment $<$ $(NH_4)_2SO_4$ $<$ inoculation of seed $<$ inoculation + $(NH_4)_2SO_4$. In all cases survival was $<$ on soils receiving no $NaClO_3$. A. G. P.

Statistical examination of yield of mangolds from Barnfield at Rothamsted. R. J. KALAMKAR (J. Agric. Sci., 1933, **23**, 161—175).—A high level of fertility is maintained on the dunged plots, but additional applications of N fertilisers still further increase yields. The presence of adequate K is necessary for the effective utilisation of N applied, and *vice versa.* In all combinations $(NH_4)_2SO_4$ was inferior to $NaNO_3$, rape cake, and dung as a source of N. Statistical data indicate a significant deterioration in many plots, including that receiving complete minerals. Slow changes other than deterioration are small in relation to the annual variation except on dunged plots. Annual variations were small on plots receiving org. manures or K, but large on those receiving artificial N fertilisers. A. G. P.

Combating damping-off of spinach by seed treatment. P. P. PIRONE (Phytopath., 1933, **23**, 28).—

Seeds are shaken for 5 min. with Cu_2O at the rate of 3—6 oz. per 10 lb. of seed. Results are as satisfactory as when the customary $CuSO_4$ soak is used. A. G. P.

Effects of hydrogen- and aluminium-ion concentration on conifer damping-off. L. W. R. Jackson (Phytopath., 1933, **23**, 18).—In culture solution containing Na_2 glycerophosphate as a source of P (relatively stable to p_H changes) the % damping-off increased from nil at p_H 2·5 to a max. at approx. neutrality. Addition of $Al_2(SO_4)_3$ reduced damping-off at p_H 3·5, but not at p_H 6·5. Solutions having p_H 2·5 were injurious to seedlings, but excellent growth occurred at p_H 3·5. Growth of *Pythium* cultures from both acid and alkaline soils was inhibited at p_H 2·5 and 3·5, increased from p_H 4·5 to p_H 6·5, and declined at higher vals. A. G. P.

Effect of sulphuric acid and aluminium sulphate on soil p_H, when used for the control of damping-off of conifers. L. W. R. Jackson (Phytopath., 1933, **23**, 18).—Changes in soil reaction following application of H_2SO_4 or $Al_2(SO_4)_3$ do not extend much below 2 in. in depth, max. alteration occurring at approx. ½ in. below the surface. A. G. P.

Irrigated pastures. Manurial trials. L. C. Bartels, E. T. Beruldsen, and A. Morgan (J. Dept. Agric. Victoria, 1933, **31**, 86—100).—In comparison with unmanured soils phosphatic fertilisers increased the protein content and nutrient val. of the herbage in proportion to the amount of available PO_4''' applied. $NaNO_3$ and $(NH_4)_2SO_4$ depressed the protein content and widened the nutrient ratio. K fertilisers were without appreciable effect. Superphosphate (I) supplemented with CaO, N, K, or $CaSO_4$ produced herbage of lower protein content and feeding val. than did (I) alone. A. G. P.

Early and late application of cattle manure, 1898—1929. K. Iversen (Tidskr. Planteavl., 1931, **37**, 545—609; Bied. Zentr., 1933, **A**, **3**, 247—248).—Autumn applications of manure, as compared with that in the following spring, may involve loss of 50% efficiency with respect to the spring crop. No differences in residual effects were, however, apparent. Losses from autumn-spread manure are attributed to volatilisation of NH_3 and leaching of NO_3' prior to sowing of seed. A. G. P.

Manurial action of lignite. G. von Strünck (Z. Pflanz. Düng., 1933, **29**, **A**, 117—131, 181).—No evidence of the presence of plant growth-promoting substances in lignite or in various preps. of lignite was obtained. A. G. P.

Relationship of plants to the lime content of their habitat. H. Schröter (Z. Pflanz. Düng., 1933, **29**, **A**, 131—141).—The direct and indirect influence of $CaCO_3$ in soil or plant distribution is discussed. A. G. P.

Effect of carbon dioxide on cultivated mushrooms. E. B. Lambert (Phytopath., 1933, **23**, 20).—In atm. containing $> 1\%$ of CO_2, growth of mushrooms was adversely affected. This is ascribed directly to the action of CO_2 and not to dilution of O_2. Injury is associated with the increased CO_2 concn. surrounding the sporophores, and not with that present in the interstices of the compost. A. G. P.

Nature of injury caused by potato leaf-hopper on forage legumes. H. W. Johnson (Phytopath., 1933, **23**, 19).—Discoloured leaves of lucerne and clover infested with leaf-hopper had higher proportions of dry matter, reducing sugars, sucrose, starch, total polysaccharides, and EtOH-sol. N, but lower total N contents than healthy leaves of uninfested plants. Leaf discoloration is not the result of injection of a sp. agent by the hopper, but is due to superfluous accumulation of the products of photosynthesis, especially the osmotically active reducing sugars. A. G. P.

Bordeaux mixture. G. E. Sanders (Phytopath., 1933, **23**, 31—32).—Addition of excess of CaO to Bordeaux mixture increases its action on early blight of potatoes. Admixture of Na_3AsO_3 (I) with $CuSO_4$ in proportions such that nearly all the AsO_3''' combines with $Cu^{\cdot}$, and subsequently adding $Ca(OH)_2$, produces a safer spray than when (I) is added to prepared Bordeaux mixture. Addition of 1 lb. of urea and 3 lb. of KH_2PO_4 per 50 gals. of Bordeaux mixture is suggested as economic practice in fertiliser distribution. A. G. P.

Copper fungicides. II. Modifications of Bordeaux mixture designed to overcome practical difficulties in its application. H. Martin (Ann. Appl. Biol., 1933, **20**, 342—363).—To permit the effective use of larger quantities of spray fluid and therefore to facilitate application Bordeaux mixture is modified by the incorporation of waste sulphite lye or is utilised for the prep. of glyceride–oil emulsions (cf. Martin and Salmon, B., 1933, 566). The presence of oil increases the retention of Cu by foliage. Nicotine may be mixed with these preps. Cu retained by leaves is determined in the ash by the ferrocyanide method. A. G. P.

Colloidal copper spray. W. P. Raleigh (Phytopath., 1933, **23**, 29).—The spray contains $CuSO_4$ 1 lb., NaOH 0·4 lb., molasses 1 pint, H_2O 2 quarts. Without dilution the mixture is set aside till yellow in colour (24 hr.) and then diluted to 50 gals. for use. A. G. P.

Total amount of copper applied and ratio of lime to copper in Bordeaux mixture as important factors in potato spraying. F. M. Blodgett, E. O. Mader, O. D. Burke, and R. B. McCormack (Phytopath., 1933, **23**, 5).—The crop increase in sprayed potatoes is largely dependent on the total Cu applied, irrespective of whether variations resulted from differences in total vol. of spray fluid, or in Cu content of the spray, or in the frequency and no. of applications. In different areas optimum results were obtained with 70—90 and 40—50 lb. $CuSO_4$ per acre. High-Mg lime gave rather better results than high-Ca lime for the prep. of Bordeaux mixture. A. G. P.

Effect of pressure and amounts of copper applied in spraying potatoes. E. O. Mader (Phytopath., 1933, **23**, 22).—Results of varying the size of the spray nozzle and the pressure of application of Cu sprays in potato yields are recorded. Evenness of distribution and the total Cu applied are the main factors in yield control. A. G. P.

Evidence of stimulation of potatoes by Bordeaux mixture. E. O. Mader (Phytopath., 1933, **23**, 22).—With increasing amounts of Cu applied, there was an increase in the no. of leaflets per plant, the fresh wt. of the tops, and the period during which plants remained green. Crops receiving the greater portion of Cu in the early part of the season produced greater yields than when applications were made at a later date. The Cu content of tubers increased with the amount of Cu applied. A. G. P.

Environment and seed treatment in relation to common potato scab. B. J. Dippenaar (Phytopath., 1933, **23**, 9).—Development of scab was greatest in soils at 40% H_2O-holding capacity and decreased with increasing H_2O content. Temp. was a less important factor, but the optimum was approx. 17°. Acidified $HgCl_2$ treatment (0·02% $HgCl_2$ + 1% HCl) gave as good results as the standard $HgCl_2$ or CH_2O methods against scab and was more effective against *Rhizoctonia*. A. G. P.

Fungicidal efficiency of mercuric chloride and potassium iodide. W. P. Raleigh (Phytopath., 1933, **23**, 28).—*Rhizoctonia* on potatoes is satisfactorily controlled by dipping in $HgCl_2$ solution (1 : 1200) to which 0·25% of KI is added. $HgCl_2$ alone and $HgCl_2$–HCl mixtures were less effective. KI solution (2%) did not give good control. A. G. P.

Absorption of salts by seeds. J. Kisser and K. Lettmayr (Z. Pflanz. Düng., 1933, **29**, **A**, 195—210).—Seed coats and cotyledons of a no. of seeds were able to absorb Cu, Ag, Zn, Mn, Pb, Mg, and Sn from dil. solutions of their salts. Results are discussed in relation to stimulation phenomena and the pickling of seed in fungicidal preps. A. G. P.

Use of formaldehyde dust with vegetable seedlings. J. D. Wilson and P. E. Tilford (Phytopath., 1933, **23**, 38).—Seed treatment with 6% CH_2O dust (6 oz. per bushel of seed) controlled damping-off without injury to seedlings. Drilling the dust in seed rows caused injury to certain crops (*e.g.*, *Cruciferæ*). CH_2O is least toxic when adsorbed on inert carriers (infusiorial earth, powdered C). Seed injury is greatest in heavy soils and in those of low org. matter contents. Medium soil-H_2O content favours injury. Seedlings should not be transplanted into treated soil until 72 hr. after application of CH_2O. A. G. P.

Effect of scab-preventive treatment on apple-tree growth and yield. D. Folsom (Phytopath., 1933, **23**, 11).—Comparison of the effects of various S and S–As combination sprays showed no apparent relationship between the nature of the spray and tree girth or between scab incidence, spray injury, and yield. A. G. P.

Spraying experiments on the control of pear scab at East Malling. M. H. Moore (J. Agric. Res., 1933, **40**, 111—119).—Comparative trials of CaO–S and Bordeaux mixture are recorded. The most satisfactory results were obtained by 3 applications ("white bud" stage, petal fall, and 3 weeks later) of a Bordeaux mixture prepared with $Ca(OH)_2$ (8–12–100). A. G. P.

Influence of spray materials on [plant] transpiration. J. D. Wilson and H. A. Runnels (Phytopath., 1933, **23**, 37; cf. also B., 1933, 404).—All Cu sprays do not increase transpiration rates in tomatoes. With a given Cu content in the spray liquid additional increments of CaO cause increasing transpiration until the quantity of CaO reaches approx. 1·5 times that of Cu. Bordeaux mixtures containing high-Ca and high-Mg limes were equally effective in increasing transpiration. A mixture of $Ca(OH)_2$ and H_2O is less effective than a Bordeaux mixture containing the same quantity of CaO. Mixtures having well-suspended particles are more effective than those which settle rapidly. Other sulphates in conjunction with CaO have the same action as $CuSO_4$. A. G. P.

Zinc hydroxide as a substitute for calcium hydroxide in arsenical sprays. R. H. Hurt (Phytopath., 1933, **23**, 17).—In As dusts or liquid sprays $Zn(OH)_2$ effectively reduces As injury. Certain varieties of apples are subject to russeting by $Zn(OH)_2$ except when this compound is used in combination with S. A. G. P.

Fungicidal properties of certain spray fluids. X. Glyceride oils. H. Martin and E. S. Salmon (J. Agric. Sci., 1933, **23**, 228—251; cf. B., 1932, 857).—The fungicidal action common to glyceride oils is associated with the glyceride structure, and is unaffected by impurities commonly removed in refining practice. Glycerol (4%) was not completely fungicidal and caused leaf injury. Oleic acid (1%) was phytocidal. Triolein (synthetic) was fungicidal and non-injurious to plants in 0·5% concn. The method of emulsification influenced the activity of the oils, unstable emulsions produced by agitation with Agral I being more effective than stable emulsions obtained by the 2-solution oleic acid method. Alkaline emulsifiers were unsuitable for this purpose, but Bordeaux mixture gave satisfactory results. A. G. P.

Relation of soil fertility to incidence of *Aphanomyces* root rot of peas. J. C. Walker (Phytopath., 1933, **23**, 36).—Application of complete fertilisers markedly reduced the % of infected plants. A. G. P.

Red spider control. P. H. Thomas and T. D. Raphael (Tasmanian J. Agric., 1933, **4**, 4—9).—Applications of CaO–S (1 : 12) and "nitro-caustic" (5–5–50) gave good control of active insects, but were useless as ovicides. For the latter purpose oil emulsions were efficient although indications of variation in the persistence of various oil films are recorded. The apparent superiority of late ovicide sprays probably results from the elimination of early-hatched insects rather than from a better kill of eggs. A. G. P.

Increasing the resistance of tobacco ring-spot virus to ageing by use of phenol. R. G. Henderson (Phytopath., 1933, **23**, 14—15).—The expressed juice of virus-infected plants to which 0·25% of PhOH was added retained its infectivity for a longer period than untreated juice. PhMe had a similar though less intense action. A. G. P.

Control of *Alternaria dianthi* causing a serious disease of the carnation. E. F. Guba (Phytopath., 1933, **23**, 12).—Dipping cuttings in $KMnO_4$ solution (1 in 1000) for 5 min. improved rooting and lessened the appearance of disease. Bordeaux mixture–Ca arsenate–linseed oil preps. were the most effective in field work. $C_{10}H_8$ fumigation as used for red-spider control decreased the disease and improved flowering, but NaCl–nicotine sulphate used for red spider is not toxic to the conidia and tends to increase the risk of disease. A. G. P.

Nodulation and the chlorosis of yellow lupins (*Lupinus luteus*). W. Scholz (Z. Pflanz. Düng., 1933, **29**, A, 59—64).—Deficient nodulation did not cause chlorosis in young lupin plants. Inoculation induced rapid nodulation even in plants rendered chlorotic by excessive liming. CaO modified both the morphological condition and the chemical composition of the roots. Fe favoured nodulation. A. G. P.

Carbohydrate manuring and the chlorosis of yellow lupin (*Lupinus luteus*). W. Scholz (Z. Pflanz. Düng., 1933, **29**, A, 142—149).—Addition of lactose to nutrient solutions tended to protect lupin seedlings against chlorosis. The plants probably utilise the Ca–sugar compounds. A. G. P.

Patents.

Production of fertilising material. H. R. Bates, Assr. to Internat. Agricultural Corp. (U.S.P. 1,872,024, 16.8.32. Appl., 5.4.29).—Acid phosphate is dropped downwardly and aq. NH_3 sprayed upwardly in a closed vessel. B. M. V.

Preparation of phosphatic fertiliser. (A) D. L. Anderson, (B) B. Ober and E. H. Wight, Assrs. to Oberphos Co. (U.S.P. 1,869,952 and 1,871,195, [A] 2.8.32, [B] 9.8.32. Appl., [A, B] 19.9.29).—(A) Insol. phosphatic material is heated with, *e.g.*, H_2SO_4 or H_3PO_4, *d* 1·56—1·63, at 25—50 lb./sq. in. under conditions such that the heat of reaction is retained in the mass, and the product, after reduction of pressure, is heated at a temp. = that obtained by heating with steam at 20 or 30 lb. (B) Finely-divided phosphate rock is digested at raised temp. and pressure with H_2SO_4 and $(NH_4)_2SO_4$ or with H_3PO_4 and $NH_4H_2PO_4$, and the product is crystallised and dried under reduced pressure. L. A. C.

Decomposition product of urea as or in fertilisers. O. Ripke, Assr. to I. G. Farbenind. A.-G. (U.S.P. 1,870,346, 9.8.32. Appl., 29.5.28. Ger., 13.6.27).—A mixture comprising mainly cyanuric acid and ammelide, prepared by heating urea at about 300° until no more NH_3 is evolved, is claimed. L. A. C.

Production of a mixed fertiliser consisting of ammonium bicarbonate and ammonium sulphate. A. Meier (U.S.P. 1,870,131, 2.8.32. Appl., 12.5.31. Ger., 14.5.30).—A mixture of a solution prepared by passing CO_2 into aq. NH_3 until just before pptn. of NH_4HCO_3 and saturated aq. $(NH_4)_2SO_4$ is treated with NH_3 and CO_2 to ppt. the desired mixture. L. A. C.

Manufacture of granular fertilisers. Kali-Forschungs-Anstalt G.m.b.H., and O. Kaselitz (B.P. 391,109, 11.9.31).—H_3PO_4 (40—80%) is sprayed on to a dry mixture of fertiliser salts in a rotating drum to produce a moist, crumbly mass which is then treated with NH_3, whereby the moisture is expelled by the heat of reaction and a granular, non-caking, fertiliser is obtained. A. R. P.

Production of granular mixed fertilisers containing ammonium phosphates. Kali-Forschungs-Anstalt G.m.b.H., and O. Kaselitz (B.P. 391,813, 25.9.31. Cf. B.P. 390,187 ; B., 1933, 464).—A mixture containing H_3PO_4 and other fertiliser material is mixed with such quantity of H_2O that on heating to 70—80° a fused mass is obtained that solidifies on cooling ; the mass is granulated and treated with gaseous NH_3. S. H. M.

Method of mulching. S. S. Eveland (U.S.P. 1,871,050, 9.8.32. Appl., 31.10.30).—The mulch is formed of paper pulp, is preferably applied by a spray, and may have an insecticide incorporated. B. M. V.

Supplying soluble fertilising agents to soil. E. L. and J. A. Prizer, Assrs. to E. L. and J. A. Prizer, D. C. Jones, and H. G. Nutt (U.S.P. 1,868,913, 26.7.32. Appl., 5.4.30).—The fertiliser, *e.g.*, $(NH_4)_2SO_4$, is applied in solution in irrigating H_2O at a concn. which remains practically uniform while the H_2O flows in contact with the surface of the soil, *i.e.*, a concn. $\ngtr$ 2000 pts. (preferably 300—1500 pts.) per 10^6. L. A. C.

Disinfecting corn and like seed. W. P. Raleigh, Assr. to Pittsburgh Plate Glass Co. (U.S.P. 1,871,200, 9.8.32. Appl., 16.12.27).—Maize seed (etc.) is dusted with a powder containing $> 2\frac{1}{2}$ ($4\frac{1}{2}$)% of Hg as the ammonio-basic salt, the remainder being inert filling. B. M. V.

Manufacture of dusting powder. G. E. Sanders (U.S.P. 1,870,383, 9.8.32. Appl., 30.3.27).—Cresylic acid absorbed on infusorial earth is mixed with hydrated CaO to produce a fluffy powder very suitable for mixing with other insecticides or fungicides. B. M. V.

Colloidal S.—See VII.

XVII.—SUGARS ; STARCHES ; GUMS.

Diffusion [of beet juice]. J. Vondrák (Z. Zuckerind. Czechoslov., 1933, **57**, 301—306).—In beet slices as ordinarily obtained in the factory, the no. of open and injured cells amounts to 34—41%, so that only about two thirds of the juice produced in the diffusion battery results from the effect of dialysis through the cellular membrane. Actually the purifying effect of diffusion is relatively small, the advantages of this operation being based rather on the convenience and elasticity of the operation. J. P. O.

Economy of lime in [beet-juice] defecation. D. Ivančenko and V. Kasjanov (Z. Zuckerind. Czechoslov., 1933, **57**, 290—292).—Using an experimental clarification plant, liming tests were conducted with the Dědek–Vašátko pre-liming method (cf. B., 1932, 1098) in comparison with ordinary hot and cold defecation, in which 1% of CaO as milk-of-lime was added, either all at once, or in a continuous stream in $<$ 2 min. Results show the former modification to be distinctly superior both in clarifying quality and in rate of filtration. In every test a higher thin-juice purity was obtained. J. P. O.

Density [of beet juice] and maturity. F. Guilbert (Bull. Assoc. Chim. Sucr., 1933, **50**, 81—85).—High purity of juice depends mainly on ripeness of the roots. Relations between ripening, rainfall, soil texture, and soil temp. at the surface and 30 cm. below are discussed, with reference to tabulated data for 1931 and 1932. J. H. L.

Solubility of sucrose in beet-house syrups. R. J. Brown and A. R. Nees (Ind. Eng. Chem., 1933,

25, 555—558).—Variations in solubility at const. temp. and degree of purity occur, due to variations in the composition of the impurities. The carbohydrate impurities appear to replace sucrose. Inorg. salts reduce the solubility when present in small amounts, and increase it when present in large quantities. $K^{\cdot}$ increases the solubility $> Na^{\cdot}$, and Cl' and $NO_3' > SO_4''$. Data obtained on one composition of syrup cannot be used for accurate control on other syrups. W. J. B.

Chemical and physical properties of sweet-potato starch. F. H. THURBER (Ind. Eng. Chem., 1933, **25**, 565—568).—The ratio of α- to β-amylose is approx. the same in sweet- (I) and white- (II) potato starches. The max. viscosities differ greatly, that of (I) being much the lower. (I) has a relatively uniform viscosity over long periods of heating, and possesses satisfactory coating and penetrating qualities for the sizing of cotton yarn. W. J. B.

Soil for sugar beets.—See XVI.

PATENTS.

Apparatus for heat-treatment of sugar solutions either completely or partly crystallised. R. BONATH, Assr. to WERKSPOOR N.V. (U.S.P. 1,868,406, 19.7.32. Appl., 10.10.29. Holl., 11.10.28).—In a trough for heating, crystallising, or moistening, the heating/cooling elements comprise hollow plates perpendicular to a hollow shaft which is rotated and supplies the heating medium. Each plate is rather > a semicircle and is staggered with its neighbour. Helical blades affording progression of the material are provided on the same shaft, and the trough may be divided into compartments. B. M. V.

EtOAc etc. by fermentation.—See XVIII.

XVIII.—FERMENTATION INDUSTRIES.

Modern chips. A. HALLERMANN (Woch. Brau., 1933, **50**, 145—147).—The use of Mammut bio-chips in the fermenting and storage vats is criticised on the grounds that these absorb and retain within the fermenting liquor substances which impart a raw flavour. Fink's conclusion (B., 1933, 406) that chips accelerate fermentation was not confirmed. Headless fermentation is recommended, since dead yeast cells and hop resins, otherwise adsorbed on the chips, are removed with the head. The yeast from headless fermentation is cleaner and stronger than that from normal fermentations and fermentations with chips, and the active hop principles in the pressed yeast amounted only to 0·55% of the hops used. R. H. H.

"Headless" fermentation. H. NIGGEMEYER (Woch. Brau., 1933, **50**, 153—156).—Beers brewed by the "headless" fermentation method (*A*) of Hallermann (B., 1931, 362) and the normal method (*B*) are compared. With a hop dose up to 250 g./hectolitre, the product of *A* has a milder taste and a slightly lower p_H, but the mildness can be attained by *B* with a smaller hop dose. With hop dose > 300 g./hectolitre *A* gives a mildness which cannot be attained by *B*. A lag occurs in *A* owing to congestion of CO_2 between the clearing plates and the fermenting liquor, and the setting up of a galvanic system between the Al plates and the Cu attemperator. An improved type of clearing plate is described. R. H. H.

Relation between sugar content and attenuation [of worts]. III. Change in the sugar content during fermentation. W. PIRATZKY (Woch. Brau., 1933, **50**, 148—151; cf. B., 1933, 327).—During fermentation, the reducing power of beer worts, expressed as "crude maltose," after an initial rise due to inversion of sucrose present, decreases in direct proportion to the decrease in extract and is represented by the equation r ("maltose") $= a.n$ (extract) $- b$; a can be determined in the original wort and the behaviour of the wort during fermentation predicted. No increase in "apparent maltose" can be detected in the fermentation of pure maltose, and hence no glucose is present outside the yeast cells. The reduced Cu no. (B., 1932, 443) of invert sugar is proportional to the sugar present and independent of the dilution. R. H. H.

Extractive substances of wines. I. Pectins and gums. II. Nitrogen compounds. G. BARBERA (Annali Chim. Appl., 1933, **23**, 95—99, 115—120).—I. When completely fermented by beer yeast, wine must contains two optically active substances: (*A*) a pectic compound, insol. in MeOH and yielding uronic acids, glucose, and galactose on hydrolysis; (*B*) a uronoid, sol. in MeOH, not coagulated by pectase, and having the same hydrolytic products as *A*.

II. The N compounds of wines are mostly NH_2-acids, which do not arise from autolysis of the yeast or from the action of yeast endotrypsin on the proteins of the must, but occur in abundance in the grape. T. H. P.

Determination of βγ-butylene glycol in fermentations. M. C. BROCKMANN and C. H. WERKMAN (Ind. Eng. Chem. [Anal.], 1933, **5**, 206—207).—The fermentation mixture is mixed with Na_2CO_3 and distilled in steam. The distillate is boiled under reflux with the addition of KIO_4 and H_2SO_4. MeCHO is liberated and is absorbed in a tower containing NH_2OH,HCl. The HCl liberated is determined by titrating with 0·05N-NaOH. $COMe_2$ will affect the results, but may easily be separated by preliminary distillation. Acetylmethylcarbinol will also react and, if present, should be determined independently and subtracted from the total result. E. S. H.

Lint [-cellulose].—See V. **Determining citric acid in cider etc.**—See XIX. **River contamination by effluents.**—See XXIII.

PATENTS.

Production of ethyl acetate, ethyl alcohol, and other products [higher alcohols] by fermentation. A. IZSAK and F. A. MCDERMOTT, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,866,568, 12.7.32. Appl., 8.11.27).—Sterilised molasses or saccharified grain mash, in presence of distillery refuse slop, is capable of fermentation by enzyme-excreting yeasts *e.g.*, *Willia anomala*, *Mycoderma vini*, and *M. lactis*. EtOH, EtOAc, fusel oil, and glycerol are produced in quantities varying with the conditions of fermentation. R. H. H.

Propionic acid fermentation by mixed strains of propionic bacteria. J. M. SHERMAN, Assr. to WILBUR

White Chem. Co. (U.S.P. 1,865,146, 28.6.32. Appl., 17.5.28).—The use of mixed cultures selected from *Bact. acidi propionici*, strains *a*, *b*, *c*, *d*, and *rubrum*, accelerates fermentation and improves the yield of $EtCO_2H$. R. H. H.

Production of organic [fatty] acids from cellulosic material. D. A. Legg and L. M. Christensen, Assrs. to Commercial Solvents Corp. (U.S.P. 1,864,746, 28.6.32. Appl., 19.2.30. Can., 22.10.29).—A cellulose mash is infected with cellulose-fermenting organisms and the acidity is maintained at p_H 5—9 by addition of alkali. The steep-H_2O of maize kernels, mixed if desired with distillery waste, is used as nutrient. R. H. H.

XIX.—FOODS.

Nature and distribution of sulphur in maize. Correlation between the sulphur : nitrogen ratio in maize and the baking value of flour. R. Guillemet and C. Schell (Compt. rend., 1933, **196**, 1052—1054).—Of the total S content of maize (0·1—0·2%), 4—5% is inorg. SO_4'', and the remainder protein-S. The S : N ratio of the H_2O-insol. protein is 0·007; that of the sol. protein varies between 0·07 and 0·12, and is higher the lower is the baking val. of the flour. A. C.

Effect of ensilaged steamed potatoes on production of milk and milk fat by cows. II. K. Richter and K. E. Ferber (Arch. Tierernähr. Tierzucht, 1932, **7**, 289—294).—Replacement of roots and concentrates by steamed-potato silage in the ration of cows increased the milk yield with little or no effect on the fat content. Greater live-wt. increases were obtained. A. G. P.

Effect of dairy manufacturing processes on the nutrient value of milk. II. Apparent digestibility of fresh whole milk and of powdered whole milk. W. B. Nevens and D. D. Shaw (J. Nutrition, 1933, **6**, 139—150; cf. B., 1933, 168).—The apparent digestibility of powdered whole milk was < that of fresh samples. No difference between spray- and roller-dried material in this respect was apparent. The digestibility of the fat and sugar constituents was not affected by drying. A. G. P.

Amyl alcohol for milk testing. J. Golding (Analyst, 1933, **58**, 276—277).—Houston's warning (B., 1933, 408) as to the selection of this reagent for the Gerber fat test is emphasised, and new supplies should be tested against the Röse–Gottlieb method on a satisfactory sample. Most supplies available in England have a lower b.p. than those cited by Houston, and satisfactory results are obtained with a product 92·4% of which distils in a 16-in. column at 136·8—137·8°/760 mm. (cf. following abstract). J. G.

Specification for amyl alcohol for use in the Gerber test. A. More (Analyst, 1933, **58**, 277—278; cf. preceding abstract).—Commercial amyl alcohol, colourless to light yellow colour, $d^{15\cdot5}$ 0·813—0·816, b.p. 124—132°, is suggested. 10 c.c. of this should mix with 10 c.c. of HCl (d 1·16) and produce permanent turbidity on further addition of 1 c.c. of H_2O; agreement with the Röse–Gottlieb test should be to within 0·05%. There is no indication that variations in the composition of the fusel oil from which the alcohol is made affects the results. J. G.

Milk-calculation formula for use at tropical temperatures. H. Hawley (Analyst, 1933, **58**, 272—274).—The solids-not-fat are given by $(0{\cdot}2872 \times G/D) + 0{\cdot}328F$, where F is % milk-fat, D the sp. gr. at 85° F./60° F. (glass in air), and $G = (1000D - 1000)$. It was obtained by the method of least squares from 18 determinations, and except in the presence of large amounts of added H_2O is accurate to within 0·2% for cow and buffalo milks. Richmond's formula does not apply, since the expansion coeff. of low-gravity milk varies considerably with the H_2O and fat contents. J. G.

Determination of the true f.p. of milk. G. W. Monier-Williams (Analyst, 1933, **58**, 254—264).—An apparatus is described with which heat exchange between the solution and surrounding medium is practically eliminated; the supercooling correction may be determined accurately; the final temp. remains const. for several min.; Et_2O vapours are avoided by drawing (instead of blowing) air through the liquid; no glass is used except for a 2-way tap; and insulation is ensured by means of a compressed-cork casing. The effects on ice formation of supercooling, incomplete stirring, the H_2O val. of the container, thermometer, and stirrer, and of heat exchange with the surrounding medium are discussed, and methods for the determination or elimination of these factors are described. The apparent f.p. of milk as determined by Hortvet's method is 0·014° below the true f.p. (— 0·536°). J. G.

Examination of the freshness of milk by determining the hydrogen-ion concentration. U. Simmert (Diss., Köln, 1929; Bied. Zentr., 1933, A, **3**, 292).—The importance of the p_H, buffer capacity, and the ratio secondary : primary PO_4 of milk in relation to its keeping quality is discussed. A. G. P.

Determination of citric acid in milk, fruit juices, and cider. H. Huber (Diss., Wurzburg, 1931; Bied. Zentr., 1933, A, **3**, 290).—Modifications of Kunze's and of Heide and Wirthle's method (oxidation with $KMnO_4$ and Br) are used. Vals. obtained permit the detection of pathological milk and the adulteration of wines. A. G. P.

Relative efficiency of various methods of sterilisation of milk utensils in the destruction of *Es coli*. A. G. Lochhead and C. K. Johns (J. Bact., 1933, **25**, 62).—Bacterial counts indicated no great difference in the sterilising efficiency of HOCl, lye, chloramine-T, and hot H_2O. With respect to destruction of *Es. coli*, hot H_2O (76·6° for 20 min.) was the most effective, lye nearly as good, and the Cl compounds were definitely inferior. A. G. P.

Analysis of Tatra Mountain sheep's-milk cheese. H. Ruebenbauer and J. Switalska (Przemysł Chem., 1933, **17**, 80—82).—The cheese contains H_2O 11·31, fat 44·4, casein 22·7, albumin 8·75, NaCl 4·5, ash 8·81, and NH_3 0·35%. R. T.

Identification of egg in food pastes. G. Bragagnolo (Giorn. Chim. Ind. Appl., 1933, **15**, 177—179).—When eggs are heated in H_2O for 10 min., then shelled and rendered homogeneous, and mixed with a HCl-pepsin solution of p_H about 1·5 at 40°, the acidity falls appreciably within a few min. With cereal flour treated similarly with pepsin, the acidity either remains about const. or rises slightly. The presence of egg in food pastes is thus detectable in 10 min. T. H. P.

Estimation of the extract of coffee and chicory. B. Dyer (Analyst, 1933, **58**, 274—275).—Jones' method normally tends to give low results, which, however, vary according to the degree of fineness of the sample and to the technique of the investigator; this may explain the high figures recorded by Bunce (B., 1933, 235). A preferable method (giving consistently a val. of about 28%) is exhaustive extraction by repeated boiling and calculation of the sol. extract from the wt. of insol. by difference. J. G.

Palatability of rapidly frozen meat. L. H. Lampitt and T. Moran (J.S.C.I., 1933, **52**, 143—146 T).—Experiments have been made to compare the palatability of rapidly frozen and slowly frozen meat, all the variables except the rate of freezing being standardised. No appreciable difference could be detected between the two types of meat.

Electrometric detection of relative freshness of haddock. M. E. Stansby and J. M. Lemon (Ind. Eng. Chem. [Anal.], 1933, **5**, 208—211).—The test consists in titrating a fish solution first to about p_H 6·0 and then to about p_H 4·3. The amount of acid used in the first step is proportional to the amount of end-products of bacterial decomp., or secondary decomp., and the second step is inversely proportional to the amount of primary change or hydrolysis of proteins which has occurred. E. S. H.

Movement of diffusible substances in food products. J. Alexander (Science, 1933, **77**, 489—490). L. S. T.

Quality factor in feeding-stuffs. J. A. Murray (J. Agric. Sci.,, 1933, **23**, 185—195).—Nutritive vals. may be represented as consisting of two factors, viz., quantity (gross energy) and quality [coeff. of availability, *i.e.*, $(D/T)-0{\cdot}35$, where T is total and D digestible org. matter]. Except in the case of oil- or protein-concentrates, the gross energy of the total org. matter in all natural vegetable feeding-stuffs is approx. the same, and for these the nutritive val. may be expressed as $(D-0{\cdot}35T)$. A. G. P.

Influence of CO_2 produced in the silo on the conservation of green fodder. O. J. Fischer (Arch. Tierernähr. Tierzucht, 1932, **7**, 190—215).—In a silo having access to air it was impossible to maintain a sufficient concn. of CO_2 over the surface of the material to prevent spoilage by O_2. With the exclusion of air from, but with no pressure accumulation within, the silo, a serviceable silage was obtained provided the material had only a moderate H_2O content and that sufficient sugar was present to produce lactic acid. Even with these conditions considerable crude protein decomp. occurred and notable amounts of $PrCO_2H$ (I) were formed. Treatment with SO_2 produced only partial improvement. Where the developing pressure of CO_2 was partly retained the silage was improved and (I) was formed only in a few cases. Addition of sugar still further improved the product. In a completely sealed silo excellent silage was obtained. No (I) was formed even when the H_2O content was high. A. G. P.

Evaluation of dyes [in foods].—See IV. **Butchers' wrapping paper.**—See V. **Lecithins in paint preps.**—See XIII.

Patents.

Manufacture of soya-bean flour. W. L. Shellabarger, Assr. to Shellabarger Grain Products Co. (U.S.P. 1,867,541, 12.7.32. Appl., 9.11.31).—Soya beans are treated *in vacuo* in a rotating drum with steam at 60°. After deodorisation is complete, cooling and drying are effected by the introduction of CO_2, a partial vac. still being maintained. When the temp. has fallen to 38°, the final cooling and drying is carried out by air at atm. pressure. The treatment at low temp. prevents the formation of insol. matter and improves the colour of the resulting flour. E. B. H.

Production of antirachitic (A) **[cereal] product,** (B) **product essence.** H. Steenbock, Assr. to Wisconsin Alumni Research Foundation (U.S.P. 1,871,135—6, 9.8.32. Appl., 27.12.26. Cf. U.S.P. 1,680,818; B., 1928, 767).—(A) Cereals or cereal products, *e.g.*, manufactured breakfast foods, or (B) materials rich in unsaponifiable lipins, *e.g.*, lipoidal extract from brains or vegetable oils, are subjected to the action of ultra-violet rays for a length of time sufficient to effect max. antirachitic activation. L. A. C.

Milk-evaporating means. W. F. Richards, Assr. to S.M.A. Corp. (U.S.P. 1,870,423, 9.8.32. Appl., 15.8.29).—A steam-heater for the air used in a drying apparatus as described in B.P. 337,080 (B., 1931, 2) is described. B. M. V.

Extraction of vegetable proteins. R. Bronsztajn (U.S.P. 1,866,698, 12.7.32. Appl., 22.10.30. Renewed 2.12.31).—After a treatment of the fat-free material (particularly nuts, castor or lupin seeds) with a bleaching agent, usually $NaHSO_3$, alkali is used to take the proteins into solution from which they are subsequently pptd. by an acid. The product is readily sol. in cold dil. alkalis. E. B. H.

Manufacture [tempering] of chocolate [masses]. O. Schramm, O. and W. Lauenstein, and W. H. Eyermann (B.P. 392,350, 27.4.32. Ger., 7.7.31).

Heating tube for bakers' ovens.—See I.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Glycerophosphates and their analysis. C. Gino (Boll. Chim. Farm., 1933, **72**, 321—326).—Methods are given for the analysis of pharmaceutical products. R. S. C.

Preparations of cod-liver oil with iron and with ferrous iodide. G. Nobili (Boll. Chim. Farm., 1933, **72**, 161—167, 201—207, 241—246, 281—293).—Commercial products are often unsatisfactory. The usual methods of prep., which may entail loss of vitamin or yield a product of low Fe content, have been critically examined. Ferruginous cod-liver oil is best prepared by using pure $Fe(OBz)_3$ with oleic acid and sweet almond oil or by a modification of Dieterich's method from a complex Fe benzoate. FeI_2 is incorporated either by formation from Fe and I in the oil or by direct dissolution of the pure compound. Standards for content of Fe or FeI_2 are suggested. R. K. C.

Fineness of division of mercury in unguentum hydrargyri cinereum and microscopical examination of unguentum hydrargyri album and flavum. L. Fuchs (Arch. Pharm., 1933, **271**, 276—287).—Holdermann's pptn. method gives mostly finely-divided Hg ointments. Commercial products contain many Hg particles of $>$ 2 mm. diam. R. S. C.

Detection of colophony in tolu balsam. W. Brandrup (Pharm. Ztg., 1933, **78**, 497).—The powdered balsam (5 g.) dissolved in $CHCl_3$ (20 g.) is mixed with light petroleum (30 g.) and, after filtering, the solution is conc. to 5 c.c. and treated according to the D.A.B. VI method. If the filtrate is evaporated and the residue dissolved in AcOH a green colour is obtained on careful addition of H_2SO_4 if colophony is present. E. H. S.

Study of the U.S.P. X method and a modified method for assay of oleoresin of aspidium. A. R. Bliss, jun., M. L. Pabst, R. W. Morrison, and E. O. Prather, jun. (J. Amer. Pharm. Assoc., 1933, **22**, 289—290).—The authors' method (B., 1932, 751) is quicker, more accurate, and less complicated than the U.S.P. X method. E. H. S.

Assay of nux vomica by a methoxy-difference method. H. M. Burlage [with M. L. Jacobs and F. J. Le Blanc] (J. Amer. Pharm. Assoc., 1933, **22**, 298—304).—Brucine is determined in the alkaloidal residues by a modified OMe method. Strychnine may be determined by difference and the method is as accurate as the oxidation method, but not as rapid. The results may be checked gravimetrically or volumetrically. Samples obtained by automatic extraction of the drug (B., 1927, 399) gave higher results than those obtained by the usual methods of extraction. E. H. S.

Caffeine content of tincture of kola nuts. J. von Mikó (Pharm. Zentr., 1933, **74**, 301—302).—The nuts contain 1·5—2·0% of caffeine (I) and for complete extraction the drug must be very finely powdered and then macerated (1 : 5) for 7 days. At least 85% of (I) is thus recovered and the tincture (D.A.B. V) contains 0·30—0·40% of (I) instead of the usual 0·10% (cf. B., 1931, 45). E. H. S.

Comparative evaluations of ergot. I. W. Kussner and P. Wolff. **II.** W. Peyer (Pharm. Ztg., 1933, **78**, 497).—I. A reply to Peyer's criticism of the author's picrate method (B., 1933, 491); his results are questioned and the Keller–Fromm method is stated to be unreliable.

II. The accuracy of the Fromm method and the author's criticism is maintained. E. H. S.

Identification of thyroid tablets. H. T. F. Rhodes and V. Cofman (Pharm. J., 1933, **130**, 459).—The B.P. colour test for thyroxine is obscured by lactose (I) or other alkali-unstable substances present in the tablets. Tablets may be tested by removing (I) in acid (p_H 5) before the test or removing the colouring matter after NaOH treatment by dissolving the ppt. in a little N-NaOH, adding 80% EtOH and, after boiling, AcOH until faintly acid, and testing the ppt. The colours developed, using HCl, H_2SO_4, or AcOH, vary unaccountably. R. S. C.

Determination of nicotine. R. Dubrisay (Mem. Manuf. de l'Etat Tabacs, 1930, **6**, 253; Bied. Zentr., 1933, A, **3**, 287).—Solutions containing equiv. proportions of nicotine and H_2SO_4 have p_H 5·6. Titration methods for determining nicotine are satisfactory if a bromocresol indicator (?) having a colour change at p_H 5·6 is used, and the end-point colour is standardised by comparison with suitable buffer solutions. A. G. P.

Direct analysis of tobacco. R. Dubrisay and François (Mem. Manuf. de l'Etat Tabacs, 1930, **6**, 264; Bied. Zentr., 1933, A, **3**, 287).—The importance of determinations of resins, waxes, and essential oils in the examination of tobaccos is discussed. Customary methods of analysis do not always give clear differentiation of types. For this purpose the following determinations are made on a C_6H_6 extract: dry matter, acidity (KOH in EtOH), sap. val., ester val., I val. Characteristic vals. for oriental, Kentucky, and Virginia tobaccos are recorded. A .G .P.

Determination of pectins in tobacco. W. Balabucha-Popzova (Staat. Inst. Tabakkunde, Krasnodar, 1930, **69**; Bied. Zentr., 1933, A, **3**, 288).—The sample is treated on a H_2O-bath with 0·5% $(NH_4)_2C_2O_4$ and the pectin is pptd. from the extract with EtOH. The ppt. is heated with 12% HCl and the pectin present is calc. from the amount of CO_2 thus produced. A. G. P.

Injection therapy. VI. Effect of sterilisation on tutocaine and larocaine solutions. S. A. Schou and O. M. Staggemeier (Dansk Tidsskr. Farm., 1933, **7**, 106—113; cf. B., 1933, 249).—The method described previously (B., 1931, 416) for determining novocaine (I) can also be used for tutocaine (II) and larocaine (III), On investigating the effect of sterilisation by this method, it was found that (II) and (III) are more stable than is (I). Autoclave treatment for 20 min. in aq. solution has no effect, but the same treatment in a phosphate buffer (p_H 6·5) caused decomp. to the extent of 12·2% and 11·4%, respectively. At p_H 7·4 the corresponding figures were 24% and 20·9%. R. P. B.

Leaf oils of Washington conifers. VI. *Abies nobilis*. E. V. Lynn and S. Nakaya (J. Amer. Pharm. Assoc., 1933, **22**, 305—306; cf. B., 1931, 416).—Steam-distillation of the leaves gave 0·3% of oil [d^{20} 0·8552, n^{20} 1·4780, n^{25} 1·4744, α^{25} (100-mm. tube) $+3·89°$, acid val. 2·61, ester val. 1·12] containing about 78% of terpenes (l-β-phellandrene, l-α- and l-β-pinene, camphene ?) and 22% of sesquiterpenes or derivatives and small amounts of phenols, esters of AcOH and possibly octoic acid, and aldehydes and ketones. E. H. S.

Constants of oil of spearmint. L. E. Warren (J. Amer. Pharm. Assoc., 1933, **22**, 294—297).—The highest and lowest records for α, n, d, and carvone content of oils examined by a dealer during the years 1921—1932 and for α and carvone content of the oils of another supplier for the years 1915—1932 are given. It is suggested that the U.S.P. requirements for [α] and carvone content are lower than the market quality warrants. The vals. —48° to —59° and $\nless$ 50% of carvone are more suitable limits. Notes on carvone determination are given. E. H. S.

Phenacetin.—See III. **Applications of O_3.**—See VII.

Patents.

Preparing tobacco substantially free from nicotine. Gen.-Direktion der Österr. Tabakrégie (B.P. 392,336, 29.3.32. Ger., 27.3.31).—An org. solvent extract (*A*) of tobacco is treated with an aq. acid solution and the steam-distillate of this extract is shaken with the original org. solvent. *A* is then incorporated with the extracted tobacco and the solvent evaporated. E. H. S.

Purifying insulin. M. S. Kharasch (U.S.P. 1,866,569, 12.7.32. Appl., 22.8.31).—The anhyd. insulin-bearing material (15—16 units/mg.) is treated with liquid NH_3, with or without the addition of solvents, acids, bases, or salts, and the purified insulin (24—27 units/mg.) is recovered by isoelectric pptn. from the NH_3 solution after addition of H_2O. E. H. S.

Production of sexual hormones from urine. Laboratoires Franç. de Chimiothérapie, and A. Girard (B.P. 392,039, 8.9.32).—Hydrolysis of the urine is effected by heating alone under pressure and the hormone is isolated by known methods. E. H. S.

Manufacture of male germ-gland hormone in pure form. Schering-Kahlbaum A.-G. (B.P. 392,434, 13.10.32. Ger., 23.10.31).—Oils containing the hormone are treated with ketone reagents and the condensation products are isolated and purified. By vac. sublimation or fractional crystallisation of the liberated hormone, a material having m.p. 178° and an activity of 0·0001—0·001 mg./capon unit is obtained. E. H. S.

Radioactive fibres.—See V. **Cinchona bark inhibitor.**—See X. **S soap.**—See XII. **Antirachitic products.**—See XIX.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Recent advances in sensitisers for the photography of the infra-red. L. G. S. Brooker, F. M. Hamer, and C. E. K. Mees (Phot. J., 1933, **57**, 258—264).—A review, with 21 references. Formulæ and sensitising properties of the tricarbocyanine group of dyes are detailed. J. L.

New process of physical development [of plates and films]. A. F. Odell (Brit. J. Phot., 1933, **80**, 286—287, 303—305).—The advantages and disadvantages of physical development are discussed. Details are given of a new simplified process; difficulties and necessary precautions are described. Methods for pretreatment with KI, and for intensification, are given. J. L.

Positive process in photography. H. Baines (Chem. & Ind., 1933, 443—447; cf. B., 1932, 401).—An account is given of the interpretation of densitometric curves, and the terms *D* max., "cut," and *G*(*D*) (average gradient). L. A. Jones' graphical method for computing the accuracy of reproduction of tone vals. is described. J. L.

Patents.

Photographic sensitive materials. Kodak, Ltd. From C. J. Staud and C. S. Webber (B.P. 392,324, 11.3.32).—Emulsions, especially colour-sensitised films, are hypersensitised with substituted NH_3 compounds containing at least one alkyl group and one OH group, *e.g.*, β-hydroxyamines, or alkylolamines, especially triethanolamine (I). The substance may be applied by bathing the film in a solution, or it may be incorporated in the emulsion or support. (I) also imparts increased flexibility to cellulose acetate or nitrate film supports. J. L.

Photographic printing emulsions. W. A. Berry, B. V. Storr, and Ilford, Ltd. (B.P. 391,790, 3.9.31).—A print-out emulsion is made containing a sol. Mn salt instead of a sol. Ag salt. The emulsion may be made "self-toning" by the addition of a Au salt, preferably together with a Pb salt and NH_4CNS. This emulsion is also suitable for use by development, after slight exposure, in a glycine developer, and may be fixed in $Na_2S_2O_3$ containing NH_4CNS. Toning and fixing may be done in two steps. A HCl stop-bath may be used after the development. J. L.

Treatment of photographic films made from cellulose esters. I. G. Farbenind. A.-G. (B.P. 391,729, 30.12.32. Ger., 10.2.32. Addn. to B.P. 391,669; B., 1933, 543).—The process for improving the mechanical properties of such films (described in the prior process; *loc. cit.*) is extended to include the treatment of films coated with photographic emulsion. The emulsion remains unaffected. J. L.

Colour photography. J. E. Williams (B.P. 391,493, 30.10.31).—Three-colour negatives are made in the usual manner. The images are printed on to pigmented $K_2Cr_2O_7$-gelatin emulsions which are coated on top of each other after each colour image below has been printed and developed. These emulsions are made to have a reticulated surface by contact with muslin during coating. The bottom image is blue, and may be made on blue-print paper (unsized) which is acidified after development; the yellow and red images are formed on top in turn. The reticulations give definition to the half-tones and a gripping surface for the emulsion above. J. L.

Photographic printing by ultra-violet light. N. V. Philips' Gloeilampenfabr. (B.P. 392,424, 5.10.32. Ger., 9.10.31).—Carriers for photographic emulsions must be transparent to $\ngtr$ 50% of light of wave-length 2894 Å. when printing on the emulsions of B.P. 361,388 (B., 1932, 129). Suitable materials for the carrier are cellophane, triacetylcellulose (pure; not "Cellon"), special glasses, *e.g.*, "Sanalux," or a glass made from pure materials having the composition SiO_2 80, B_2O_3 10, CaO 5, Al_2O_3 5%. J. L.

Treating cellulose films etc.—See V. **Light-producing compositions.**—See XXII.

XXII.—EXPLOSIVES; MATCHES.

Coefficient of swelling of nitrocellulose in mixtures of ether, alcohol, and water. Thomas (Mém. Poudres, 1932—33, **25**, 115—120).—The coeff. represents the increase in vol. (c.c.) of 1 g. of dry nitrocellulose when left in contact with a known quantity of solvent. The method of determining it is described. Results are given for CP_1 in Et_2O-EtOH containing 10—90% of 95·2°, 85·3°, and 75·6° EtOH, respectively, and in EtOH and Et_2O alone. Vals. are given for the coeff. of absorption, as defined by Desmaroux. The curves for the 2 coeffs. have a similar form, but that for the absorption coeff. gives the more regular results.

W. J. W.

Solubility of nitrocellulose in mixtures of alcohol and water. Lacape and Thomas (Mém. Poudres, 1932—33, **25**, 109—114).—In the official method of determination, there is a tendency for the EtOH to become conc., and if dissolution is effected at $<$ 74—75° to reduce this the time is unduly prolonged. In a modified method a coil condenser is used, the temp. being kept at 74—75°. Results are given for the solubility of CP_2, not previously decarbonated, in EtOH of various concns., a correction being made for the solubility of the chalk. The N content of the CP rendered sol. in EtOH is lower than that of the original. By successive treatments with EtOH of increasing concns. it is possible to separate CP into fractions of different degrees of nitration.

W. J. W.

Volumetric determination of nitroglycerol and of nitroglycerol and dinitrotoluene in admixture. W. W. Becker (Ind. Eng. Chem. [Anal.], 1933, **5**, 152—154).—Nitroglycerol or ethylene glycol dinitrate is dissolved in AcOH with addition of excess of $FeCl_2$ and HCl, the solution is boiled, and the resulting $Fe^{\cdot\cdot\cdot}$ titrated with $TiCl_3$ solution, using NH_4CNS as indicator. 2 : 4-Dinitrotoluene does not interfere and may be determined in the residual solution by reduction with $TiCl_3$ in the usual way. Small amounts of diphenyldiethylurea or $NHPh_2$ do not interfere. E. S. H.

Muzzle-flash suppression. Demougin (Mém. Poudres, 1932—33, **25**, 130—141).—A list of muzzle-flash suppression agents in decreasing order of their effectiveness is given, and the action of the various classes is discussed. With portable firearms and guns of small calibre cellulose flour gives the best results; it is easily incorporated, does not affect stability, and does not give rise to smoke. NH_4NO_3 reduces flash to a great extent and can be used in considerable amount without reducing the strength of the powder. For large calibres, K H tartrate and KCl are used, but they cause an appreciable amount of smoke, and as they must be used in large amount they tend to lower the pressure. The action of catalytic flash-suppression agents, such as alkali salts, Sn, and antidetonants, can be studied only by investigating a large no. of substances of different chemical and physical properties, even those, such as Li salts, I, and $CaCl_2$, which have no practical application. Dautriche's method may be employed.

W. J. W.

Muzzle-flash suppression. Thermodynamic action of alkali salts. J. Fauveau and Le Paire (Mém. Poudres, 1932—33, **25**, 142—159).—On theoretical grounds it is shown that the corollary to Fleury's hypothesis, *i.e.*, that mixtures of alkali salts with flash-reducing properties will have a greater effect than the salts themselves possess, is unsound. In practical tests with B.F.P. both in a 7-mm. rifle and by Dautriche's method, with KCl, KI, KBr, KF, NaCl, NaI, and mixtures of these, this was confirmed. The hypothesis itself is criticised. If the lowering of the temp. of the explosion gases is due to the endothermic dissociation of the salts, the inertia of alkaline-earth salts is not explained. $CaCl_2$, in particular, is strongly dissociated and has a higher heat of formation than have the alkali salts. Furthermore, the hypothesis does not explain the flash-reducing properties of monat. metals, *e.g.*, K, Na, Li, which undergo no dissociation. It would seem that the action of alkali salts is chemical and not physical. W. J. W.

Ballistics of rifle powders. Desmaroux (Mém. Poudres, 1932—33, **25**, 121—129).—The ballistics of BFP and a German powder are compared with those of BN_3F, shots being fired in progressively shortened barrels. The combustion of the powders during the initial movement of the projectile was studied, and calorimetric bomb tests were made to determine the pressure, *d*, and composition of the explosion gases. W. J. W.

Auto-ignition temp. of CO–air mixtures.—See II.

Patents.

Explosives. A. C. Scott (B.P. 391,881, 11.11.31 and 2.5.32).—A heating composition for use with compressed CO_2 consists of an O-carrying salt, *e.g.*, $KClO_4$, and a non-inflammable cellulose ester, *e.g.*, cellulose acetate, with which may be mixed an inert material (silicate) to regulate combustion, or a resinous substance or synthetic resin, this being introduced in solution. The product is made into cakes while plastic, dried to remove solvent, and granulated. W. J. W.

Explosive. P. Naoum, Assr. to E. I. Du Pont de Nemours & Co. (U.S.P. 1,865,382, 28.6.32. Appl., 3.1.31. Ger., 4.6.30).—$Ca(NO_3)_2$ is melted by high-pressure steam and then completely dehydrated at $>$ 100°, whereby it disintegrates into a fine powder, and subsequently mixed with nitroglycerin, with or without trinitrotoluene, and carbonaceous material (wood charcoal, with or without sawdust). Suitable compositions are outlined. W. J. W.

Explosive. A. Hough (U.S.P. 1,868,388, 9.7.32. Appl., 3.12.28).—Diethylene glycol dinitrate is used alone or dissolved in nitroglycerin. It has a high stability. W. J. W.

Explosive. J. A. Hammond, Assr. to California Cap Co. (U.S.P. 1,872,941, 23.8.32. Appl., 7.7.30).—Black powder is rendered free-flowing by coating the grains with a solution of asphalt in, *e.g.*, CS_2. The proportion of asphalt may be 8%. B. M. V.

[Liquid oxygen] explosive. G. B. Holderer and Le R. V. Clark (U.S.P. 1,865,104, 28.6.32. Appl., 8.6.31).—The absorbent consists of granular carbonaceous material (25% passing 100-mesh) which has been sprayed with a binding agent, *e.g.*, a 1—10% solution of starch, so that it becomes agglomerated, but retains its porosity, and has a final moisture content of about 10%.

W. J. W.

Light-producing ignitable compositions. Imperial Chem. Industries, Ltd., and S. H. Lucas (B.P. 391,195, 21.10.31 and 12.4.32).—A metallic powder, *e.g.*, Mg, Al, or Zr, is mixed with Bi_2O_3 and/or Na bismuthate together with SrO_2. The composition is insensitive to shock or friction and remains stable. W. J. W.

Impregnation of materials for use in [low-density] explosives. IMPERIAL CHEM. INDUSTRIES, LTD. From HERCULES POWDER CO. (B.P. 391,196, 21.10.31).—Low-density materials, such as wood pulp, bagasse, and balsa or bongo wood, are impregnated at 100° with a fused eutectic mixture of NH_4NO_3 and another salt, *e.g.*, $NaNO_3$, NH_4Cl, or NaCl, and subsequently mixed with nitroglycerin and NH_4NO_3. W. J. W.

XXIII.—SANITATION; WATER PURIFICATION.

Presence of lead dust and fumes in the air of streets, automobile repair shops, and industrial establishments of large cities. J. J. BLOOMFIELD and H. S. ISBELL (J. Ind. Hyg., 1933, **15**, 144—149).—The Pb content (mg. per 10 cu. m.) of air from various industrial establishments not using Pb averaged 0·10, the highest val. (0·35) occurring in a sewing room. The air of automobile repair shops averaged 0·13 (max. 1·11) and that of streets 0·09 (max. 0·34). F. O. H.

Apparatus for purifying air. G. MÉNIER (Compt. rend., 1933, **196**, 1054—1056).—The apparatus consists of an endless strip of cloth, each side 0·56 × 3·50 m., supported vertically on two rollers, the lower one being immersed in saturated aq. $Ba(OH)_2$; the strip is moved electrically at 2·50 m. per min., and the air driven against it by an electric fan. With this apparatus purification of the air in a wagon (capacity 30 cu. m.) in which CO_2 and a bacterial culture had been diffused was practically complete in 30 min. C. A. S.

Aerofilter for purifying air. C. RICHET (Compt. rend., 1933, **196**, 1061).—The similarity of the Ménier device (cf. preceding abstract) to the author's aerofilter, in which the air is similarly caused to pass through a spray of H_2O instead of against a wet cloth (cf. Bull. Acad. Médecine, July, 1909), is pointed out. C. A. S.

Precise automatic apparatus for continuous determination of carbon dioxide in air. M. D. THOMAS (Ind. Eng. Chem. [Anal.], 1933, **5**, 193—198).—The apparatus permits the continuous, automatic measurement of CO_2 concn. at the intake and outlet of fumigation chambers, thus giving a determination of the amount absorbed or evolved by experimental plants in the chamber. The max. error in determining total CO_2 in the air is $<1\%$. The CO_2 is taken up by NaOH solution contained in a special absorber, which involves a fritted Pyrex glass disc to break the stream into fine bubbles, which are further stabilised by adding a little Bu^aOH. A simplified apparatus, operated by hand, is also described. E. S. H.

Contamination of rivers by industrial effluents. PEQUART (Bull. Assoc. Chim. Sucr., 1933, **50**, 75—81).—Injury to fish and other ill effects attributed to industrial effluents are in many cases due more to a highly infected condition of the rivers, and would not occur in normally clean rivers. An example discussed is that of a French distillery the purified effluents from which enter the Scance, a tributary of the Meuse. The wash-waters from the beets are purified by subsidence but contain numerous algæ; the diffusion effluent and vinasses are purified with CaO and $Al(OH)_3$. The total vol. of effluent is $<1\%$ of the river H_2O. The latter, owing to agricultural and village effluents, was found to contain already 800,000 organisms per c.c., including 5000 *B. coli* and 40,000 *Micrococcus ureæ*, besides numerous algæ. The distillery effluent is relatively harmless in itself, though it contributes nutriment to the organisms in the river. The algæ belong to the family *Nostocaceæ* and form zoogl œic masses which probably injure fish by obstructing the gill passages rather than by depriving the H_2O of O_2, for they contain chlorophyll. J. H. L.

Production of potable water by infiltration and treatment of surface water. H. HAUPT (Gas- u. Wasserfach, 1933, **76**, 279—283).—The possibility and methods of producing a germ-free, colourless, odourless, good-tasting H_2O from surface H_2O are discussed. R. N. B.

Applications of O_3.—See VII. **Corrosion of steel pipes.**—See X.

PATENTS.

Manufacture of disinfectants. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 389,514, 15.8.31).—Phenols carrying an olefinic side chain [$\cdot CH_2\cdot CH\colon CHR$ or $\cdot CH\colon CH\cdot CH_2R$ (R = alkyl C_2—C_4)] are synthesised by the usual methods. Examples are: NaOPh heated with $CH_2Br\cdot CH\colon CHEt$ to give o-$OH\cdot C_6H_4\cdot CH_2\cdot CH\colon CHEt$ (I), b.p. 118—120°/8 mm., isomerised by alcoholic KOH to o-$OH\cdot C_6H_4\cdot CH\colon CHPr$, b.p. 126—128°/8 mm.; salicylaldehyde treated with MgBuBr to give (I); anisaldehyde with MgBuBr to give p-$OHMe\cdot C_6H_4\cdot CH\colon CHPr$, b.p. 138—140°/15 mm., demethylated with MgEtBr at 120—160° to the phenol, b.p. 121—125°/3 mm. C. H.

Sewage-treatment tanks. C. J. HARTLEY (B.P. 391,661, 18.8.32).—In 2-storey, sectional aëration tanks suitable for the activated-sludge process (cf. B.P. 323,156; B., 1930, 220), horizontal bends are substituted for spirals at the ends of adjacent channels so that the liquor remains in the same upper or lower section of the tank during its passage from one channel to the next. C. J.

Treatment of sewage. W. C. LAUGHLIN (B.P. 392,017, 22.7.32).—Sewage is treated with a cellulose slime produced by beating together waste paper etc., CaO, and H_2O and also with a suitable coagulant, *e.g.*, $FeCl_3$. The solids are separated in an upward-flow tank in which the influent is directed into the lower portion of the basin by means of suitably placed baffles. The effluent is withdrawn at the surface and may be further treated if necessary; the sludge produced is dewatered on a rotary vac. filter. C. J.

Improving the taste and odour of water. J. C. BAKER and F. C. SCHMELKES, Assrs. to WALLACE & TIERNAN PRODUCTS, INC. (U.S.P. 1,866,524, 12.7.32. Appl., 18.8.28).—In the sterilisation of H_2O by Cl_2, chlorophenolic tastes and odours may be prevented without resorting to superchlorination if a small quantity of $FeSO_4$ ($<0·2$ p.p.m. Fe) and a smaller amount of $(NH_4)_2SO_4$ be added to the H_2O as accelerators of the reaction. C. J.

Treating H_2O.—See I.