

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

AUG. 17 and 24, 1934.*

I.—GENERAL; PLANT; MACHINERY.

Studies on the industrial furnace. I. Relation between gas and wall temperatures. S. YAGI (J. Soc. Chem. Ind., Japan, 1934, 37, 159–162 B).—The coeff. obtained by dividing the cube of the true gas temp. (G) in a furnace by the temp. difference between gas and wall is approx. const. for different vals. of G , but varies regularly with the gas velocity. R. S. B.

Mechanism of filtration. II. P. C. CARMAN (J.S.C.I., 1934, 53, 159–165 T; cf. B., 1934, 1).—The equation $dV/d\theta = P/\eta r_1 c(V + V_0)$ derived previously (*loc. cit.*), where V = vol. of filtrate per unit area, θ and P = time and pressure of filtration, c = concn. of suspension, V_0 = cloth resistance, and r_1 = "sp. resistance" of the cake material, was tested for const.-pressure filtration of Fe_2O_3 and CaCO_3 , which form compressible cakes, and also for kieselguhr, which gives a nearly incompressible cake. Tests were also made with cakes deposited at $>$ one pressure, e.g., it was raised in stages from 25 lb. to 100 lb. per sq. in. It is assumed that V_0 does not vary with P . Results are shown as graphs of θ/V' against V' , V' being the vol. collected in time θ . These graphs are straight lines, and for each val. of P there is a single val. of r_1 independent of variations in concn. and η . With stage filtration at different pressures r_1 for each stage is a function of P . C. I.

Case for the transport of perishable substances. F. LORENZOLA (Annali Chim. Appl., 1934, 24, 229–231).—A vac.-jacketed cylindrical vessel encloses a second cylinder containing a no. of tubes—surrounded by freezing mixture—into which the sample bottles are fitted. A rubber-lined cover closes the tubes.

T. H. P.

Plant for varnish manufacture.—See XIII. Sugar machinery.—See XVII.

See also A., July, 748, **Colorimetry**. 749, **Applications of dielectric measurements**. 750, **Rapid determination of sp. gr. Falling-sphere viscosimeter**.

PATENTS.

Open-hearth furnace. G. W. FINNEY (U.S.P. 1,936,621, 28.11.33. Appl., 14.9.31).—The outlets from the regenerators to the stacks are controlled by dampers sectionalised so that after ascertainment of uneven temp. by pyrometers the flow of gases may be adjusted to equalise the temp. B. M. V.

Furnace and method of operation. W. TRINKS, Assr. to LIBBEY-OWENS-FORD GLASS CO. (U.S.P. 1,933,571, 7.11.33. Appl., 16.10.30).—In a reversing regenerative furnace operated with coke-oven gas, this is mixed with some products of combustion to raise

the velocity of the mixture in the regenerator to prevent deposition of C, the gases being heated above the cracking point in order to obtain a luminous flame. B. M. V.

Vacuum drum-dryer. H. D. MILES and D. B. MONTGOMERY, Assrs. to BUFFALO FOUNDRY & MACHINE CO. (U.S.P. 1,933,819, 7.11.33. Appl., 27.10.31).—A pan for feeding milk (e.g.) to an enclosed heated drum and means for removing the dry material without breaking the vac. are described. B. M. V.

Apparatus for conducting catalytic processes. B. E. THOMAS, Assr. to MONSANTO CHEM. CO. (U.S.P. 1,936,610, 28.11.33. Appl., 14.10.29).—A method of circulating the temp.-regulating bath surrounding a bank of vertical catalyst tubes is described. B. M. V.

Cleaning of [catalytic] contact material. B. M. CARTER, Assr. to GEN. CHEM. CO. (U.S.P. 1,936,154, 21.11.33. Appl., 23.4.30).—The contact material is agitated without substantial disarrangement of the particles, e.g., by agitation of the supporting trays, and an inert gas is passed through at high velocity to remove foreign substances. B. M. V.

Composition for removing boiler scale and the like and its preparation. D. W. HAERING (U.S.P. 1,936,714, 28.11.33. Appl., 29.5.31).—A fluid for addition to the H_2O in, or for use in washing out, boilers comprises the fermented, diluted, and heated juice (prep. described) of plants of the order *Opuntiales* (e.g., the cactus species) and contains weak org. acids and mono-, di-, and poly-saccharides. B. M. V.

Treatment of fused material. J. E. JEWETT, Assr. to NAT. ANILINE & CHEM. CO., Inc. (U.S.P. 1,934,716, 14.11.33. Appl., 31.1.30).—A body of H_2O is circulated (and cooled) and at one point is caused to flow in the form of a hollow converging cone under reduced pressure, and a fused mass (e.g., indoxyl in NaOH) is injected into the hollow space until the aq. solution is of the desired concn. B. M. V.

Dryer and granulator. R. S. KENT (U.S.P. 1,934,930, 14.11.33. Appl., 8.7.31).—An open-ended, inclined drum is provided with internal lifting flights on the shell and an internal breaker-screen in the form of a squirrel cage. B. M. V.

Hammer crusher. S. D. HARTSHORN, Assr. to PENNSYLVANIA CRUSHER CO. (U.S.P. 1,936,599, 28.11.33. Appl., 12.7.30).—Inclined feed and breaker plates are described. B. M. V.

Device for crushing and pulverising ore and other refractory material. J. A. McCASKELL, Assr. to UTAH ROYALTY CORP. (U.S.P. 1,936,728, 28.11.33. Appl., 12.5.31).—A gyratory crusher is driven at a high speed by a motor shaft (M) within the hollow shaft of

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

the gyratory cone (*C*). *M* is provided with a crank pin on which is a floating eccentric bush engaging with the interior of *C*. B. M. V.

Impact pulveriser. N. H. ANDREWS and W. J. WILLOUGHBY, Assrs. to AMER. PULVERIZING CORP. (U.S.P. 1,935,344, 14.11.33. Appl., 16.6.31).—Pulverisation is effected by mutual impact brought about by a no. of radial jets of gas pointing to a common focus; the bottom of the focal chamber is protected by a loose bed of hard material, and the expanded fluid (bearing with it the pulverised material) is discharged upwards. B. M. V.

Apparatus for comminuting materials. F. S. YOUTSEY (U.S.P. 1,936,742, 28.11.33. Appl., 4.8.27).—Methods of driving jaw crushers, involving a compound motion of both jaws and resilient means to store energy on the crushing stroke, are described. B. M. V.

Pulveriser and separator. G. H. FRASER (U.S.P. 1,936,593, 28.11.33. Appl., 1.9.31).—The apparatus utilises circulation of air up through and down outside a stationary ring-die, the driving spider for the crushing rolls embodies the feed means, and a blower causes an external circulation through a separator for fine material, the cleaned air being returned. B. M. V.

[Laboratory] grinding mill. J. P. RUTH, JUN., Assr. to RUTH CO. (U.S.P. 1,933,764, 7.11.33. Appl., 28.10.31).—Liquid may be fed through the hollow shaft while the mill is in operation, and the drum is discharged by tilting. B. M. V.

Mixing machine. A. LASCH and E. STRÖMER, Assrs. to BAKER PERKINS CO., INC. (U.S.P. 1,936,248, 21.11.33. Appl., 1.3.32. Ger., 7.3.31).—A mill especially suitable for rubber or tough material comprises a pair of rolls with cylindrical ends and a central bladed portion in the form of a distorted triangle, running closely within a jacketed housing. B. M. V.

Mixing and sifting machine for dry powdered materials. R. HINKLE (U.S.P. 1,937,385, 28.11.33. Appl., 17.12.31).—Mixing paddles, and brushes over an arcuate screen, are disposed in separate compartments. B. M. V.

Rotary screening apparatus. G. H. HUTTON (B.P. 411,666, 4.5.33).—A trommel (*T*₁) is surrounded by a second trommel (*T*₂), concentric with it. The meshes in *T*₂ are finer than those in *T*₁. Spiral chambers are provided between *T*₁ and *T*₂ to assist in the separation of the fines. An increased output is claimed. [Stat. ref.] A. WE.

Fraction separation of pulverulent materials. A. B. CUMMINS, Assr. to CELITE CORP. (U.S.P. 1,934,410, 7.11.33. Appl., 31.5.30).—Diatomaceous earth is dried to < 10% of H₂O and disintegrated into coherent masses of three sizes; each size is dispersed separately in a pneumatic current and separated, the residues (*R*) forming the major part, and the dusty air is settled. *R* are redispersed and separated as many times as is necessary to obtain the desired no. of products. B. M. V.

Apparatus for agitating fluid masses and separating materials. T. M. CHANCE, by F. H. CHANCE

and PROVIDENT TRUST CO. OF PHILADELPHIA (Exors.) (U.S.P. 1,937,190, 28.11.33. Appl., 8.1.32).—In a vessel for sand-pulp flotation, the sand is kept in suspension by admission of pressure fluid in the lower part, that fluid being diffused throughout the pulp by rotating stirrers, but the rotation of the pulp is removed by baffles at an intermediate level so that the upper or actual classifying zone is subjected only to the transverse agitation produced by the feed of raw material and withdrawal of light constituent at the opposite side. B. M. V.

Mixing and stirring machines. M. PÖNISCH (B.P. 411,763, 12.12.33).—Mixing, in a deep vessel (*V*), is brought about by the action of a propeller (*P*) in the bottom of *V*. *P* has two sets of blades (*B*) rotating in opposite directions. *B* rotating in a clockwise direction are close to the sides of the tank; those having an anti-clockwise motion are short. The production of an intensive circulatory action is claimed. A. WE.

Mixing of materials. A. R. TATTERSALL (B.P. 411,584, 25.1.33).—A machine (*M*) for incorporating solids (*S*) with any liquid medium (*L*) is described. The movement of *S* through *M* is brought about by a screw conveyor (*C*), rotating with its axis vertical. *L* is fed by gravity, at a predetermined rate, on to the lower portion of *C*, and the mixing is brought about by friction. A. WE.

Mixing device [dissolver]. R. GUTH (U.S.P. 1,934,304 and 1,928,128, [A] 7.11.33, [B] 26.9.33. Appl., [A] 13.1.30, [B] 9.1.31).—A dissolver for making, e.g., soapsuds comprises a container divided by a horizontal partition, the only communication between the two compartments being a perforated vertical pipe (*P*). The solid material is introduced into the upper compartment and H₂O or other solvent sprayed upon it, the solution running down into the lower reservoir, assisted, if desired, by a jet of H₂O applied (*A*) alternately with the dissolving H₂O by the operation of one cock, or (*B*) simultaneously. B. M. V.

Mixing of solid materials [powders etc.]. R. BENNET (B.P. 411,699, 15.7.33).—The powders (*P*) to be mixed are fed from the base of hoppers (*H*) on to rotating discs (*D*), from which they are discharged by centrifugal force. *P* blend together during the time they are falling from *D* to the floor of the containing vessel (*V*). The proportions of the blend can be controlled by adjusting the feed aperture at the base of *H*. *H* can be either stationary or rotating. The blend is removed from the base of *V*. A. WE.

Plant for rendering powdered material homogeneous. N. NIELSEN (B.P. 411,492, 8.12.32).—A mixing vessel (*V*) has valves thereon, whereby compressed air (*A*) may be introduced. *A* causes homogenisation of the powdered material (*P*) and enables it to behave as a fluid. Increase in the pressure of *A* causes *P* to be ejected from *V* along air-conveyor piping to a suitable storage vessel. A. WE.

Centrifugal separator. C. G. HAWLEY (U.S.P. 1,933,588, 7.11.33. Appl., 2.7.31).—An eliminator of moisture and/or dirt from gases, of the type in which a vortex is externally skimmed, is described. B. M. V.

Centrifugal separator. O. B. GERMOND (U.S.P. 1,936,130, 21.11.33. Appl., 28.12.31).—A centrifuge in which the alluvial material (*e.g.*, Au) drops into a cup on the axis is described. B. M. V.

Centrifugal separation. E. N. TRUMP (U.S.P. 1,933,644, 7.11.33. Appl., 6.1.31).—A centrifuge with conical basket is provided with an inner conical deflector to regulate the discharge of solid matter. Epicyclic gearing is described in which the relative rotation is obtained by imparting slow rotation (by hand or otherwise) to a ring gear. B. M. V.

Centrifugal separating bowl. O. E. FRÖDING, ASSR. to DE LAVAL SEPARATOR CO. (U.S.P. 1,935,117, 14.11.33. Appl., 8.8.30. Swed., 29.8.29).—The centrifugal bowl is conical and from the largest circumference of the cone the collected heavy matter is led through straight radial passages formed in the solid base to discharge apertures which are near the axis, but at a greater radius than the discharges for light matter, which are at the apex of the cone. B. M. V.

Loading centrifugal extractors. H. KRANTZ and H. BUYSCH, ASSRS. to H. KRANTZ (U.S.P. 1,935,506, 14.11.33. Appl., 17.2.31. Ger., 27.1.31).—Laundry or other goods are placed evenly in a basket divided into sections and are then lifted above the centrifuge and dropped into it section by section. B. M. V.

Filtering device. N. R. THIBERT (U.S.P. 1,935,136, 14.11.33. Appl., 30.6.32).—The filter proper comprises a sausage of filter medium supported on a spiral wire and bent into a circle, the ends being joined by a T-piece which forms the draw-off. B. M. V.

Clarifier. W. C. LAUGHLIN, ASSR. to FILTRATION EQUIPMENT CORP. (U.S.P. 1,935,642, 21.11.33. Appl., 6.6.29).—A supply launder (*A*) is placed between two ranks of clarifying chambers (*B*), which are topped by baskets (*C*) containing filter material and embody the final outlets, which are in the form of flexible pipes. The flow is downward from *A*, upward through *B* and *C*; when *C* are raised one at a time for cleaning, the outflow is automatically prevented from that basket. B. M. V.

Removal of colloidal substances from liquids of vegetable or animal origin [sugar-beet juices]. J. DĚDEK and J. VAŠÁTKO (B.P. 409,332, 26.9.32. Czechoslov., 25.9.31).—In the pptn. of colloidal matters by a ready-made reagent which, if added all at once, must be exactly gauged to produce max. pptn., exact gauging is avoided in the process claimed, by addition of the reagent in indefinite excess so slowly that the ppt. becomes insol. in excess of the reagent. *E.g.*, raw beet juice is prelied by the continuous or intermittent addition of 0.3–0.5% of CaO (as milk-of-CaO or dry) over a period of 15–20 min., with continuous stirring, after which the rest of the CaO required prior to carbonation is added at one time. J. H. L.

Apparatus for treatment of liquids with gaseous fluids. R. R. LEFFLER (U.S.P. 1,936,305, 21.11.33. Appl., 18.1.33).—The liquid is caused to flow in upward zig-zags under and over shelves of concrete or the like in the upper faces of which porous tiles (or the like) and connecting conduits are inserted for the admission

of gas. On the undersides pockets are formed for the release of used gas at intermediate levels, the remaining free gas being vented at the upper surface before the liquid enters an exit trough. B. M. V.

Multiple-effect evaporators. C. MCNEIL (B.P. 411,429, 5.11.32).—Each effect in the evaporator has an internal inclined calandria (*C*). A pipe is connected between the conc. liquor outlet and the base of *C*, so that recirculation in any particular effect can be obtained at will. A. WE.

Distillation and the like. F. E. LICHTENTHAELER, ASSR. to LUMMUS CO. (U.S.P. 1,934,674, 7.11.33. Appl., 21.8.28).—A tower with decks which are pierced with radial openings, and provided with adjacent vanes inclined in the same direction on any one deck and in the opposite direction on the next deck and having their long edges curled to form gutters, is used for absorption, condensation-dissolving, and the like. B. M. V.

Apparatus for distilling dry-cleaners' solvent. C. H. HAPGOOD, ASSR. to DE LAVAL SEPARATOR CO. (U.S.P. 1,935,183, 14.11.33. Appl., 3.1.29).—A still comprises three superposed chambers containing coils for, in order downwards: (1) heat exchange between vapours and ingoing liquid, (2) evaporation, (3) completion of condensation, the wet vapour passing from (1) to (3) through an axial passage. B. M. V.

Distilling and fractionating apparatus. A. PLACEK (U.S.P. 1,936,523, 21.11.33. Appl., 7.2.31).—The apparatus is similar to a Frenier pump, reversed as regards flow of the liquid; the latter is not allowed to form obstructive pools and flows countercurrent to a treating gas. B. M. V.

Fractionating apparatus. F. W. HALL, ASSR. to TEXAS CO. (U.S.P. 1,935,709, 21.11.33. Appl., 26.8.31).—In a tower containing bubbling trays the flow of liquid is zig-zag from tray to tray and the serrations on the bubbling caps are made larger on one side to assist the transverse flow of liquid. B. M. V.

Emulsifying apparatus. F. O. W. and D. M. LOOMIS (U.S.P. 1,935,884, 21.11.33. Appl., 3.6.31. Can., 4.5.31).—In an apparatus of the disintegrator type, the runner is provided with separate inlets for the two fluids and is arranged to deliver them to the grinding space in a no. of subdivided alternating streams. B. M. V.

Mixing gases with liquids. A. H. MUNRO, ASSR. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 1,935,190, 14.11.33. Appl., 30.7.31).—The gas is admitted through a ring of downwardly-directed jets above an impeller which circulates the froth or mixture downwards inside and upwards outside a draught tube. B. M. V.

Gas-cleaning tower. A. N. CROWDER, ASSR. to RESEARCH CORP. (U.S.P. 1,937,265, 28.11.33. Appl., 6.10.31).—A wet scrubber (*A*), a moisture eliminator (*B*), and an electrical precipitator (*C*) are placed, in order downwards, in a tower in which the flow of gas is also downwards, but the clean gas returns upwards outside the tubes of *C* before leaving, the pptd. dust etc.

being collected in a conical bottom. After elimination of the coarse drops of H_2O in *B* a fine mist may be injected before *C*. B. M. V.

Air separators. T. J. STURTEVANT, ASSR. to STURTEVANT MILL Co. (U.S.P. 1,933,604—6, 7.11.33. Appl., [A] 14.7.30, [B, C] 25.11.30).—(A) Air is circulated up an inner separating chamber (*P*) and down an outer settling chamber (*Q*), the inward transfer from *Q* being peripherally at the bottom of *P* and the outward transfer centrally at the top, the latter being baffled underneath by a rotating disc (*R*) extended as a perforated screen to approx. the full diam. of *P*. Below *R* on the same shaft is the centrifugal distributor of the feed; the circulating fan is also on the same shaft, but above *P*. (B, C) Other forms of rotating baffle are described. B. M. V.

Dust collector. O. N. GREDELL, ASSR. to STANDARD STEEL WORKS (U.S.P. 1,933,730, 7.11.33. Appl., 25.11.31).—The collector is of the cyclone type, baffles being provided to cause the air flowing downwards to the outlet to lose its velocity by contraction and expansion. B. M. V.

Treatment [sterilisation] of fluids. O. H. HANSEN, ASSR. to HANSEN CANNING MACHINERY CORP. (U.S.P. 1,935,777, 21.11.33. Appl., 26.5.30).—Liquids are sterilised in a gear-wheel pump provided with a jacket; the surfaces are so effectively wiped that the temp. of the jacket may be $>$ that of deterioration of the liquid. B. M. V.

Detection of leaks in a closed gas system. H. W. CROUCH, ASSR. to EASTMAN KODAK Co. (U.S.P. 1,933,791, 7.11.33. Appl., 20.3.31).—A closed gas circuit, e.g., air for solvent recovery, is mixed with an easily assayed gas not otherwise present, and the proportion of that gas is determined from time to time. B. M. V.

Apparatus for determining the specific gravity of gases and vapours. H. A. ROMP (U.S.P. 1,937,437, 28.11.33. Appl., 27.8.28. Holl., 14.3.28).—The balance wheel or pendulum of a clock is provided with compartments which may be filled alternately with a sample and standard gas. B. M. V.

Pyrometer tube. A. T. KATHNER (U.S.P. 1,937,199, 28.11.33. Appl., 9.4.29).—A steel, impervious to gases at 980° , containing Cr 25–35 and Ni $< 1\%$ is claimed. B. M. V.

Viscosimeter. H. C. RULE, JUN. (U.S.P. 1,934,739, 14.11.33. Appl., 2.2.32).—The apparatus comprises a pendulum with a bob of stream-line form which is allowed to fall (swing) in an arcuate passage open to the atm. at the ends, and also through the restricted passage which accommodates the arm of the pendulum. B. M. V.

Hygrometer. K. C. D. HICKMAN, ASSR. to EASTMAN KODAK Co. (U.S.P. 1,933,803, 7.11.33. Appl., 3.1.29).—Dry gelatin having $n >$, and wet gelatin with $n <$, that of linseed oil, a series of emulsions of aq. gelatin, and oils of graduated n are prepared, and the truly transparent mixture is discovered by the aid of a photo-electric device. B. M. V.

Solid CO_2 .—See VII. Treating gases or liquids.—See XI. Porous [rubber] materials.—See XIV.

II.—FUEL; GAS; TAR; MINERAL OILS.

Fusibility of coal ash. II. Determination in a reducing atmosphere. Y. KOSAKA and H. TODA (J. Soc. Chem. Ind., Japan, 1934, 37, 188–189 B; cf. B., 1934, 562).—The apparatus has been modified to permit determinations to be made in a reducing atm. Almost all the ashes examined showed a fall in the softening point in a reducing atm. The fall, however, was greatest in a medium reducing atm., and the softening point rose again as the atm. was made more strongly reducing. A. B. M.

Effects of added substances on ignition and combustion characteristics of carbon. I. Y. OSHIMA, Y. FUKUDA, and M. AKASHI (J. Soc. Chem. Ind., Japan, 1934, 37, 184–188 B).—The ignition temp. and rates of combustion of C black, alone and impregnated with 5% of KOH, K_2CO_3 , or KCl, have been determined by the method described previously (cf. B., 1932, 326, 709; 1933, 736). The ignition temp. were: original C 508° , washed C 497° , C (+ KOH) 278° , C (+ K_2CO_3) 286° , and C (+ KCl) 403° . The combustion velocity was practically unaffected by the presence of the added substances. A. B. M.

Test on a tar-carburettor water-gas generator. T. PAYER (Gas- u. Wasserfach, 1934, 77, 339–346).—A test was made on a Pintsch plant carburetting brown coal tar, special attention being paid to steam and air metering. Gas was sampled by drawing H_2O from a holder at a rate proportional to the gas make. Heat, material, and cost balances over one day are given. E. H. M. B.

Purification and drying of town's gas by refrigeration in Mainz. H. PIPPIG (Gas- u. Wasserfach, 1934, 77, 346–349).—Gas after leaving the condensers is cooled to -4° by spraying with condensate cooled by an NH_3 refrigerator. Analyses of the condensate are given. The capacity of the NH_3 washers is increased by 60% as the H_2O temp. is lowered from 12° to 7° by the cold gas. H_2O picked up in the purifiers (dew point 20°) is removed by cooling the gas with NaCl solution. A saving of 0.0288 Pf. per cu. m. is effected. E. H. M. B.

Electrical precipitation of tar fog from coke-oven gas. J. BRADWELL (Gas World, 1934, 100, Coking Sect., 61–66, 69–72).—The principles underlying electro-detarring and the various methods of producing high-tension current are discussed. The installation at one of the coking plants of the Nunnery Colliery Co. (Sheffield) is described, and comparisons are made between the W.W.-D. system of electro-detarring and the more common methods in general use for the detarring of coke-oven gas. G. M.

Sulphuric acid recovery in [gasworks] ammonia manufacture. SCHUMACHER (Gas- u. Wasserfach, 1934, 77, 337–339).— H_2SO_4 accounts for one half of the cost of $(NH_4)_2SO_4$ manufacture. About 20% of the H_2SO_4 required for NH_3 recovery can be obtained by burning the NH_3 -still waste gases over a V catalyst at 450° . A 92% yield of 90% water-white H_2SO_4 is obtained by condensation in a special condenser. A layout of the plant is shown diagrammatically. E. H. M. B.

Firedamp explosions : projection of flame. III. Effect of branch galleries and of bends. M. J. BURGESS (Safety in Mines Res. Bd., Paper No. 83, 1934, 20 pp.; cf. B., 1928, 556).—When CH_4 -air mixtures are exploded in tubes (2 in. diam.) having branch tubes at right-angles to the main tube the total distance of projection depends on the amount of release afforded to the pressure of the explosion. An increased distance of projection was obtained with one or more side tubes ahead of the flame. When a side tube joined the main gallery in the region of the explosive mixture, instead of just beyond it, the distance of projection was less. The max. total distance of projection observed was about $7\frac{1}{4}$ times the original length of the explosive mixture. The presence of a side tube near the point of ignition reduced the total distance of projection. In the experiments with bends, when the ignition was central the distance of projection tended to be less along the bent limb of the tube. With end ignition the projections in both directions were increased with bends of 90° and 120° , but there was no marked effect with bends of 30° and 60° . The mechanism underlying the observed effects and the influence thereon of the $[\text{CH}_4]$ in the explosive mixture have been studied. A. B. M.

Significance of propane and butane as industrial gases. H. BRUECKNER (Gas- u. Wasserfach, 1934, 77, 425–429).—An account is given of the industrial prep., physical properties, and behaviour on combustion of C_3H_8 and C_4H_{10} . Their industrial and domestic possibilities are indicated, with examples from practice in the United States. These include cold enrichment of water-gas and use as fuel in airships. E. H. M. B.

Products of hydrogenation of phenolic oil in low-temperature tar. III. Formation of the high-boiling alcohols. S. ANDŌ (J. Soc. Chem. Ind., Japan, 1934, 37, 189–190 B; cf. B., 1933, 452).—By hydrogenating fractions of purified tar acids from low-temp. tar at 270 – $295^\circ/80$ atm. in presence of NiO they were almost completely converted into hydro-aromatic alcohols of the cyclohexanol series. A. B. M.

Hardness of asphalt. Methods of determination. M. C. SIEGMANN (Verfkroniek, 1934, 7, 176).—A review of the factors influencing and the methods of measuring the hardness of asphalt. D. R. D.

Paraffins in crude shale oils. I. Y. TANAKA, R. KOBAYASHI, T. KUBOTA, and I. ARAKAWA (J. Soc. Chem. Ind., Japan, 1934, 37, 210–211 B).—The oil is extracted with 9.4% EtOH, and the residual paraffins are freed from asphalt by treatment with conc. H_2SO_4 and filtration through Japanese acid clay. The product from Fushun (Manchuria) shale oil has m.p. 33 – 44° , b.p. 37.5 – $180^\circ/0.0567$ – 0.0068 mm. (23% at 135 – $160^\circ/0.0365$ mm., m.p. 32.4°). H. A. P.

Phase equilibria in hydrocarbon systems. III. Solubility of dry natural gas in crude oil. W. N. LACEY, B. H. SAGE, and C. E. KIRCHER, JUN. (Ind. Eng. Chem., 1934, 26, 652–654; cf. A., 1934, 490; B., 261).—Curves showing the solubility of natural gas (CH_4 84.4, C_2H_6 8.6, C_3H_8 6.6, heavier constituents 0.4%) in a no. of crude oils at 37.8° and for pressures up to 3000 lb. per sq. in., the liquid vol. changes due to

dissolution of the gas, the d of the solution, similar curves for CH_4 and one of the oils, and curves relating (a) solubility and d of the oil and (b) apparent d of dissolved gas and equilibrium pressure, are given and discussed. D. K. M.

Cracking and hydrogenation of heavy oils. G. PROVENZAL (L'Ind. Chimica, 1934, 9, 441–447).—Attention is drawn to Serono's patent of 1904 regarding the production of gas from oil by treatment with H_2 at high temp., and the enrichment of coal- and water-gas. A bibliography of recent Italian contributions to the subject is given. H. F. G.

Vapour-phase cracking. I. H. OTSUKA (J. Soc. Chem. Ind., Japan, 1934, 37, 183–184 B).—Gas oil (b.p. 200 – 300°) was cracked by being passed through an electrically-heated SiO_2 tube (100 cm. long, 2 cm. diam.) at 500 – 750° ; the rate of feed of the oil was 3.1 – 3.3 g./min. The yields of cracked distillate fell from 95% (0.9% of b.p. $< 200^\circ$) at 500° to 51% (19.1% of b.p. $< 200^\circ$) at 750° . The gas yields rose from 0.54 litre per 100-g. charge at 500° to 55.4 litres at 700° . The distillates of b.p. $< 200^\circ$ contained 30–34% of unsaturated and 30–42% of aromatic hydrocarbons. A. B. M.

Peroxides in gasoline. Peroxidation in relation to gasoline composition. J. C. MORRELL, C. G. DRYER, C. D. LOWRY, JUN., and G. EGLOFF (Ind. Eng. Chem., 1934, 26, 655–657; cf. B., 1934, 612).—The tendency of cracked gasolines to form peroxides with O_2 is due partly to conjugated diolefines and partly to other olefines. Removal of these yields a product resistant to oxidation. The results of submitting a no. of pure hydrocarbons to the bomb oxidation test are given; the oxidation of paraffins, cyclohexane, and aromatic hydrocarbons is zero or negligible. D. K. M.

Refining of lubricating oils by hydrogenation. M. MIZUTA and C. TADA (J. Soc. Chem. Ind., Japan, 1934, 37, 211–212 B).—The crude oil distillate is purified by treatment with H_2SO_4 and freed from acid. It is hydrogenated at 150 – $440^\circ/100$ atm. over (I) $3\text{CoO} \cdot 3\text{Cr}_2\text{O}_3 \cdot 3\text{Al}_2\text{O}_3 \cdot 1\text{MoO}_3$, (II) $6\text{CoO} \cdot 3\text{Cr}_2\text{O}_3 \cdot 3\text{Al}_2\text{O}_3 \cdot 2\text{MoO}_3$, or (III) $\text{NiO} \cdot 3\text{CuO}$. η , stability (to heat), and demulsibility are improved by hydrogenation; the most suitable temp. for allround purposes appears to be 380 – 426° . Further increase of stability is obtained by after-treatment with Japanese acid clay. (I) and (II) are best for improving colour, C residue, and stability, and (III) for improving demulsibility. H. A. P.

Flow of petroleum lubricating greases. Dependence of apparent viscosity on temperature, rate of shear, oil viscosity, and soap content. M. H. ARVESON (Ind. Eng. Chem., 1934, 26, 628–634; cf. B., 1932, 376).—Flow-characteristic curves for greases containing a Ca soap are given. The η of a grease depends not only on the known factors, but on the soap factor, which, in turn, is dependent on the soap concn. and temp. Bingham's equation does not satisfactorily represent all the data. A theory of the behaviour of grease during flow is given. D. K. M.

Application of the Steiner viscosimeter to detecting adulteration of ozokerite with paraffin. E.

ERDHEIM (Rocz. Chem., 1934, 14, 281—284).—The high η of ozokerite at $> 80^\circ$ as compared with that of paraffin enables admixture of the latter readily to be detected.

R. T.

CH₂O from water-gas.—See III. Fouling Fe₂O₃ mixtures with H₂S. Catalyst for prep. of H₂.—See VII. Waste wood.—See IX. Gas in steel industry. Oil-cracking apparatus.—See X.

See also A., July, 738, Catalytic synthesis of hydrocarbons. 743, Micro-analysis of gaseous mixtures. 782, Oxidation of [technical] pyridines. High-boiling bases from anthracene oil.

PATENTS.

Pyrolytic conversion and coking of mixtures of finely-divided solid carbonaceous material and hydrocarbon oil. A. L. MOND. From UNIVERSAL OIL PRODUCTS Co. (B.P. 409,969, 29.8.33).—Finely-pulverised coal, lignite, etc. is mixed with coal tar, crude petroleum, etc. and the mixture is first heated in a coil to a mild cracking temp., and then introduced into coking chambers (C) which are provided with floors constructed of refractory material of high heat conductivity, e.g., SiC, fused Al₂O₃, etc., heated from below to a high temp. The volatile products pass to a fractionating column and condensing system; part or all of the high-boiling products may be returned to C, the heating coil, or the mixing tank. The lower-boiling products form a motor fuel of high anti-knock val. The coke formed is discharged periodically from C.

A. B. M.

Manufacture of charcoal briquettes. S. JAEGENDORF (B.P. 409,999, 2.10.33. Austr., 6.10.32).—A mixture of finely-divided wood charcoal with 17—30% of wood tar or similar binder is kneaded, preferably at about 50° , until the elasticity of the mixture is substantially destroyed. It is then compressed into moulds. If desired, the briquettes may subsequently be baked at 200—500°.

A. B. M.

Carrying out of catalytic [hydrogenating] reactions. J. Y. JOHNSON. From I. G. FARBERIND. A.-G. (B.P. 409,824, 19.12.32).—Carbonaceous materials are treated with hydrogenating gases under pressure and at raised temp. in presence of a catalyst, e.g., MoO₃, supported on a non-metallic carrier, e.g., active C, lignite coke, Al₂O₃, active SiO₂, etc., which has been treated with sufficient acid, e.g., HCl or H₂SO₄, approx. to neutralise any basic substances present therein.

A. B. M.

Gaseous fuels [for airships]. L. DE FLOREZ, Assr. to TEXAS Co. (U.S.P. 1,936,155—6, 21.11.33. Appl., [A] 14.11.28, [B] 25.9.33).—Fuels, of approx. the same d as that of air, for the engines of lighter-than-air vessels are claimed, viz., (A) H₂ 52 and C₄H₁₀ 48, (B) H₂ 27.5 and C₃H₈ 72.5 (approx.) %. B. M. V.

Gas producers. W. W. TRIGGS. From HUMBOLDT-DEUTZMOTOREN A.-G. (B.P. 409,709, 2.8.32).—A gas producer (P) is provided with a probe lever in the upper part of the shaft, which automatically controls the fuel supply, with a stationary scraper, which prevents caking of the ash on the bottom of the ash pan, with an independently adjustable ash-withdrawal device, and with a temp.-sensitive device in the steam and air supply

pipe for regulating automatically the amount of steam supplied to P. A. B. M.

Gas manufacture. G. G. OBERFELL and R. W. THOMAS, Assrs. to PHILLIPS PETROLEUM Co. (U.S.P. 1,926,170, 12.9.33. Appl., 24.5.28).—A hydrocarbon fuel of b.p. $< 0^\circ$ is passed from a pressure storage tank to a vaporiser (V) and thence, after admixture with air, to either the combustion chamber of a boiler (B) or to an internal-combustion engine (E). The flue gases or exhaust gases from the latter are cleaned and then enriched by the addition of a further amount of the vaporised fuel, whereby a gas suitable for use as town's gas etc. is produced. Part of the heat developed in B or E is utilised in V. A. B. M.

Gas purification. W. W. ODELL (U.S.P. 1,926,058, 12.9.33. Appl., 2.10.30).—Fuel gas which has been freed from tarry matter, gums, and H₂S, but which still contains some gum-forming substances (G), e.g., indene or styrene, and also some condensable vapours, e.g., C₆H₆, is compressed, e.g., to 100 lb./sq. in., whereby, under the influence of the increased pressure and the consequent rise in temp., the G are converted into gum which dissolves in the droplets of condensed vapour which are formed at the same time. The gas is then oil-scrubbed while still under pressure, to remove the condensed vapour and gum. The presence of a small amount of O₂ in the gas facilitates gum formation.

A. B. M.

Treatment of gases or inflammable vapours for production of light sources for therapeutic, photographic, penetration, and other purposes. A. E. BATCHELOR (B.P. 409,801, 21.11.32. Cf. B.P. 205,216; B., 1923, 1214 A).—A combustible liquid is impregnated with small quantities of salts, e.g., KNO₃, SrNO₃, LiCl, CuCl, etc., and of NH₃, or an alkaline NH₄ compound, with or without the further addition of an iodide, and is burned, with air or O₂, in contact with an infusible pastille.

A. B. M.

Purification of tar acids. C. BANTA, Assr. to BARRETT Co. (U.S.P. 1,926,665, 12.9.33. Appl., 28.8.29).—Tar acids are freed from S compounds by distillation under reduced pressure (< 25 mm. Hg), whereby the S compounds are not decomposed and are retained in the distillation residue.

A. B. M.

Preparation of high-grade synthetic asphalts. S. C. FULTON and V. KALICHEVSKY, Assrs. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,926,523, 12.9.33. Appl., 29.12.31).—Low-grade asphalts are blended with cracked petroleum tar resins free from asphaltenes and substantially free from oil.

A. B. M.

Purification of sulphur-oil compositions. P. O. POWERS, Assr. to NEWPORT INDUSTRIES, INC. (U.S.P. 1,926,648, 12.9.33. Appl., 4.4.32).—S-terpene bases, which when admixed with lubricating oil form cutting oils for metal working (cf. U.S.P. 1,844,400; B., 1932, 1019), are freed from corrosive and odoriferous S compounds by washing with aq. NaOH and then with H₂O.

A. B. M.

Production of active charcoal or reactivation of spent charcoal. F. KRCZIL (B.P. 411,918, 17.12.32. Czech., 4.1.32).—See U.S.P. 1,927,459; B., 1934, 565.

Apparatus for making inflammable gas. W. G. HOLZSCHUH (U.S.P. 1,926,589, 12.9.33. Appl., 12.5.31).

[Centrifugal] separation [of sand and oil-well slime]. H. S. COE (U.S.P. 1,934,406, 7.11.33. Appl., 18.8.30).

Wax-like substances.—See III. $(\text{NH}_4)_2\text{SO}_4$ dryer.—See VII. Bituminous concrete. Materials for roads. Bitumen sheeting. Toughening wood.—See IX. Purifying waste [coal-washery] liquors.—See XXIII.

III.—ORGANIC INTERMEDIATES.

Synthesis of formaldehyde from water-gas. E. M. BOTSCHAROVA and B. N. DOLGOV (J. Gen. Chem. Russ., 1934, 4, 145–152).—6% yields of CH_2O are obtained by passing water-gas at $400^\circ/125$ atm. over a $4\text{MgO}-\text{Mn}_2\text{O}_3$ catalyst. R. T.

Manufacture of [cyclo]hexanone and its derivatives by the contact process. K. TAMURA and B. SENUMA (J. Soc. Chem. Ind., Japan, 1934, 37, 212–213 B).—Reduced $\text{Cu} + 10\% \text{Na}_2\text{CO}_3$ when used as a dehydrogenating catalyst for conversion of methylcyclohexanol into methylcyclohexanone in H_2 at 350° maintains its activity indefinitely and does not tend to have a dehydrating action. H. A. P.

Determination of phenol in phenol melts. N. N. VOROSCHCOV, JUN. (Anilinokras. Prom., 1934, 4, 166–167).—10 c.c. of 10% aq. BaCl_2 are added to 10 c.c. of the solution of the melt (containing 1.5–3% of PhOH), the vol. is made up to 100 c.c., the solution filtered, and PhOH determined in an aliquot portion by Koppeschaar's method. R. T.

Purification of crude anthracenes with pyridine bases. M. A. ILJINSKI, A. A. ZAJKIN, and L. I. BRANBURG (Anilinokras. Prom., 1934, 4, 152–155).—12.5% crude Donetz anthracene (I) is boiled with 4 vols. of H_2O , filtered, and the residue washed with hot H_2O and EtOH successively, when 27% (I) is obtained, with a loss of 16%. $\text{C}_5\text{H}_5\text{N}$ bases (2 pts.) and H_2SO_4 (0.1 pt.) are added per 1 pt. of pure (I) in the 27% product, and the mixture is warmed; on cooling, 94.2% (I) crystallises out in 86% yield. R. T.

C_3H_8 and C_4H_{10} as industrial gases. Products from tar.—See II. Polymerised org. acids in lacquers etc.—See XIII.

See also A., July, 738, Catalytic synthesis of hydrocarbons. 739, Electrolytic oxidation of β -hydroxypropionic acid. 752, Prep. of C_2H_6 , $n\text{-C}_7\text{H}_{16}$, and C_2H_4 and homologues. 753, Prep. of alkyl bromides, and of octyl alcohol and Me hexyl ketone. 754, Detection of "peroxide" in Et_2O . 761, Prep. of $(\text{CH}_2)_6\text{N}_4$, and of nitriles from esters. 763, Formation of Ph_2 from C_6H_6 . 767, Prep. of p -dimethylaminobenzyl alcohol. 770, Synthesis of phenanthrene derivatives. 771, Prep. of NH_4 phthalate. 773, Action of S on ketones. Prep. of aromatic nitro-ketones. 782, Oxidation of [technical] pyridines. High-boiling bases from anthracene oil. 790, Identification of org. compounds.

PATENTS.

(A, c) Catalysts for acetylene polymerisation.

(B) Production of vinyl derivatives of acetylene.

(A) J. A. NIEWLAND and R. R. VOGT, (B) J. A. NIEWLAND, and (c) F. B. DOWNING, A. S. CARTER, and D. HUTTON, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,926,055–6 and 1,926,039, 12.9.33. Appl., [A, B] 29.12.30, [c] 16.2.32).— C_2H_2 is polymerised in presence of a Cu^I salt (CuCl), free Cu , a salt of NH_3 or a (*tert.*) amine ($\text{C}_5\text{H}_5\text{N}$), and (A) a carboxylic acid having an ionisation const. of $< 10^{-6}$, e.g., HCO_2H , AcOH , $\text{CH}_2\text{Cl}\cdot\text{CO}_2\text{H}$, EtCO_2H , PrCO_2H , citric or lactic acid (in absence of H_2O), and (B) an inorg. acid (HCl) capable of forming a Cu^I salt sol. in the mixture in sufficient quantity to give $p_H < 6$, and H_2O as solvent. (c) The process using the above catalysts [preferably (B)] is carried out in an inert non-aq. solvent of high b.p. (polyhydric alcohols and their hydroxyalkyl ethers, e.g., glycerol, and ethylene and diethylene glycols).

H. A. P.

Manufacture of alcohols from olefines. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 411,303, 26.6.33. Holl., 8.7.32).—The polymerised hydrocarbons formed as by-products in the hydration of olefines (I) are extracted from the hydrolysed or unhydrolysed solution of (I) in H_2SO_4 by a solvent (C_6H_6) which is the same as that used in the azeotropic dehydration of the alcohol. H. A. P.

Oxidation of *sec.*-alcohols [to acids]. E. L. PELTON and C. C. KENNEDY, Assrs. to Dow Chem. Co. (U.S.P. 1,926,059, 12.9.33. Appl., 2.10.31).—A *sec.*-methylcarbinol is oxidised to the carboxylic acid containing 1C less ($\text{CHMe}_2\cdot\text{OH} \rightarrow \text{AcOH}$, $\text{CHMeEt}\cdot\text{OH} \rightarrow \text{EtCO}_2\text{H}$) by heating with $\text{KOH}-\text{NaOH}$ (in ratios of 1:3 to 2:1) at $200\text{--}325^\circ$ ($290\text{--}300^\circ$). H. A. P.

[Preparation of] keto-alcohols. R. H. VAN SCHAAK, JUN., Assr. to VAN SCHAAK BROS. CHEM. WORKS, INC. (U.S.P. 1,926,567, 12.9.33. Appl., 17.12.29).— COMe_2 is condensed with COMeEt in presence of bases (NaOH or CaO , diluted by inert matter, e.g., CaSO_4) at $< 25^\circ$ to give a mixture of δ -hydroxy- δ -methylhexan- β -one and ϵ -hydroxy- ϵ -methylhexan- γ -one. Higher homologues are claimed from COMe_2 and $\text{C}_4\text{--C}_7$ ketones. They are solvents for pyroxylin. H. A. P.

Conversion [isomerisation] of unsaturated alcohols. N. V. DE BATAAFSCHE PETROLEUM MAATS., Asses. of H. P. A. GROLL and M. W. TAMELE (B.P. 411,741, 23.10.33. U.S., 4.11.32).—The isomerisation of $\beta\gamma$ -unsaturated alcohols, particularly such as contain *tert.*-C, into carbonyl compounds in acid media (aq. H_2SO_4 and H sulphates) is carried out as far as possible in homogeneous solution, the CO compound being removed as formed either by distillation, cooling, or extraction. Thus isobutenol is added gradually to 10–13% H_2SO_4 at $90\text{--}120^\circ$ ($> 105^\circ$), and the Pr^iCHO recovered from the distillate, or $\text{CHCl}\cdot\text{CMe}\cdot\text{CH}_2\cdot\text{OH}$ is added slowly to 15% H_2SO_4 at 100° , the liquid allowed to settle, the lower oily layer of β -chloroisobutaldehyde separated, and the addition etc. repeated. Other examples include the isomerisation of $\text{OH}\cdot\text{CMe}\cdot\text{CMe}\cdot\text{CH}_2$ to COMePr^i and of the crude chlorination products of phenylisobutene. H. A. P.

Manufacture of vinyl chloride. W. J. TOUSSAINT, ASSR. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 1,926,638, 12.9.33. Appl., 15.2.32).—Dry HCl and C_2H_2 (excess) are passed into anhyd. $SnCl_4 + (0.75\%) HgCl_2$ (at 55°). H. A. P.

Production of unsaturated esters. J. W. C. CRAWFORD, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 410,208, 17.11.32).—Lower esters of α -hydroxy- α -alkylpropionic (α -hydroxyisobutyric) acids (3 mols.) are heated with $POCl_3$ (1–1.5 mols.) in presence of a polymerisation inhibitor (quinol, S). Thus $OH \cdot CMe_2 \cdot CO_2Me$ (1 mol.) is heated at the b.p. with $POCl_3$ (0.5 mol.) and 0.05% of S, and the product distilled at $> 200^\circ$, giving 76% of theory of $CH_2 \cdot CMe \cdot CO_2Me$. H. A. P.

Manufacture of acetic and other aliphatic acids from alcohols. USINES DE MELLE, ASSEES. of H. M. GUINOT (B.P. 410,373, 4.9.33. Fr., 16.9.32).—The alcohol (EtOH) is oxidised with an agent that can be regenerated by electrolysis (dichromates), the acid formed (AcOH) is extracted by a solvent (EtOAc), and the residual aq. solution electrolysed and used in a subsequent batch. H. A. P.

Manufacture of esters of diethylmalonic acid. DR. A. WACKER GES. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 410,385, 12.9.33. Ger., 12.9.32).—The acid and alcohol are heated together in presence of an esterification catalyst (conc. H_2SO_4) in an inert solvent (capable of forming azeotropic mixtures containing H_2O , e.g., C_6H_6 and homologues). Examples are Et_2 , b.p. $100^\circ/12$ mm., and Bu_2 diethylmalonate, b.p. 143 – $146^\circ/12$ mm. H. A. P.

(A) **Production of acylated esters of hydroxy-acids.** (B) **Ester of hydroxy-fatty acids of castor oil.** E. J. POWERS (U.S.P. 1,927,295–6, 19.9.33. Appl., [A] 24.7.29, [B] 18.6.30).—(A) The acid or its ester (glyceride) is heated with an ester of a monocarboxylic acid in presence of an esterification catalyst (H_2SO_4 , H_3PO_4). Lactic acid, EtOAc, and $NaHSO_4$ (5%) at the b.p. give Et acetyl-lactate; tartaric acid, BuOAc, and H_2SO_4 give Bu_2 diacetyl-tartrate; and castor oil or ricinoleic acid with EtOAc and Et acetoacetate give Et acetyl- and acetoacetyl-ricinoleate, respectively. (B) Esters of acylated OH-acids of castor oil (Bu acetylricinoleate, b.p. 220 – $235^\circ/3$ – 5 mm., prepared as above and separated from glycerol and BuOAc) are claimed as plasticisers for cellulose nitrate. H. A. P.

Production of dimethylamine. L. C. SWALLEN and J. MARTIN, ASSRS. to COMMERCIAL SOLVENTS CORP. (U.S.P. 1,926,691, 12.9.33. Appl., 24.12.31).— NH_2Me or mixed amines from NH_3 and MeOH containing much NH_2Me are passed over a dehydration catalyst ($Al_2O_3 \cdot xH_2O$, Al silicate) at 300 – 500° (425 – 475°). H. A. P.

Manufacture of sulphonic acids. W. W. TRIGGS. From FLESCHE-WERKE A.-G. F. GERBSTOFF-FABR. U. CHEM. PROD. (B.P. 411,773, 15.5.33. Cf. B.P. 406,889; B., 1934, 443).—Unsaturated aliphatic compounds are condensed with alkyl-di- or -tri-sulphonic acids. Thus hexadecene is condensed with excess of $CH_2(SO_3H)_2$ in presence of conc. H_2SO_4 at 10° , octadecenylamine

is condensed with $CHO \cdot CH(SO_3H)_2$ (I) in conc. H_2SO_4 at 25 – 30° , and Bu oleate with (I) at 10° . The products are used as wetting, dispersing, cleansing, and emulsifying agents. H. A. P.

Preparation of hydrocarbons [retene from abietic acid]. I. GUBELMANN and C. O. HENKE, ASSRS. to NEWPORT INDUSTRIES, INC. (U.S.P. 1,926,676–7, 12.9.33. Appl., 18.3.29).—Abietic acid is volatilised with steam at 220 – 240° and passed over active C (410°), V_2O_5 (520°), ZnO , Cr_2O_3 , MnO , CuO , or MoO_3 at 350 – 650° . H. A. P.

Manufacture of styrols [styrene]. O. H. SMITH, ASSR. to NAUGATUCK CHEM. CO. (U.S.P. 1,926,314, 12.9.33. Appl., 3.1.30).—A chlorinated PhEt (8–25% Cl) is heated at the b.p. with a (cyclic *tert.*) amine (C_5H_5N). H. A. P.

Manufacture of sulphonic acids of benzene series. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 411,458, 6.12.32).—5-Chloro-2-aminophenyl ethers and their acyl derivatives are sulphonated with H_2SO_4 , H_2O at $> 50^\circ$, the SO_3H entering the 4-position. Sulphonic acids of 5-chloro-2-aminophenyl Me ether, its Ac, acetoacetyl, benzoylacetyl, and terephthaloylbis derivatives, and of 5-chloro-2-acetoacetamidophenyl Et ether, are described. H. A. P.

[**Manufacture of**] **sulphonated derivatives of acylated aromatic amino-compounds.** R. WREN-SHALL (U.S.P. 1,926,506, 12.9.33. Appl., 6.8.32).—An arylamine or substitution product is acylated with a natural fatty acid of $< C_5$ and the product sulphonated. A product of this type is prepared by condensing dihydrochaulmoogryl chloride with $p-NH_2 \cdot C_6H_4 \cdot OEt$ in Et_2O and sulphonating the product (conc. H_2SO_4 at 0°). H. A. P.

Prevention of discoloration in liquid aromatic amines. IMPERIAL CHEM. INDUSTRIES, LTD. From E. I. DU PONT DE NEMOURS & CO. (B.P. 411,433, 1.12.32).—Dissolved O_2 is removed by bubbling an inert gas (N_2) through the liquid. The product is fast to light in a closed vessel. H. A. P.

Manufacture of wax-like substances. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 410,087, 28.10.32 and 24.2.33).—Mixtures of aliphatic acyl compounds in which the no. of C atoms \times the no. of acyl groups is < 10 are heated with decarboxylating catalysts in the liquid phase under such conditions that direct linking occurs to form longer C chains (the catalysts used are such as induce ketone formation) and the products are hydrogenated. From montan and carnauba waxes, e.g., by heating at 310 – 360° with Fe or Fe-kieselguhr and hydrogenation of the product at $250^\circ/300$ atm. (Ni-kieselguhr) neutral unsaponifiable waxes of high m.p. (80 – 104°), apparently consisting essentially of higher hydrocarbons, are obtained. Waxes of lower m.p. but similar characteristics are obtained from olive oil, train oils, tallow, tall oil, oxidised paraffin waxes, or corresponding free fatty acids. H. A. P.

Substituted hydroxyalkyldiphenylmethanes. E. KLARMANN and L. W. GATES, ASSRS. to LEHN & FINK, INC. (U.S.P. 1,926,873, 12.9.33. Appl., 29.3.32).—

Interaction of Na 4-chloro-*o*-tolyl-oxide with CH_2PhCl (I) in PhMe at the b.p. is claimed to give phenyl-5-chloro-2-hydroxy-*m*-tolylmethane, m.p. 55°, b.p. 172–174°/4.5 mm., also obtained by chlorination of the product from *o*- $\text{C}_6\text{H}_4\text{Me}\cdot\text{ONa}$ and (I). *p*-Chlorophenyl-2-hydroxy-*m*-tolyl- and a mixture of phenyl-5-chloro-2-hydroxy-*o*-tolyl- and -*p*-tolyl-methanes, b.p. 176–178°/4.5 mm., are similarly prepared. H. A. P.

Hydrogenation of organic compounds. RÖHM & HAAS Co. (B.P. 410,148, 12.8.32. U.S., 12.8.31).—Unreduced $\text{CuO}\cdot\text{Cr}_2\text{O}_3$ catalysts activated by alkali or alkaline-earth (hydr)oxides are claimed for liquid-phase hydrogenation. H. A. P.

Electrolytic reduction of organic nitro-compounds. M. E. CUPERY (U.S.P. 1,926,837, 12.9.33. Appl., 10.7.31).—The NO_2 -compound [$1:2:4\text{-OH}\cdot\text{C}_6\text{H}_3(\text{NO}_2)_2$] is dissolved in EtOH–HCl and electrolysed in an atm. of HCl (free from O_2) at < 30° (20–30°), a depolariser (PhOH) being introduced at the anode. $1:2:4\text{-OH}\cdot\text{C}_6\text{H}_3(\text{NH}_2)_2\cdot 2\text{HCl}$ is pptd. during reduction. H. A. P.

Manufacture of phenol and apparatus therefor. DR. F. RASCHIG GES.M.B.H. (B.P. 410,331, 20.6.33. Ger., 20.6.32).— C_6H_6 , HCl, and air are caused to interact to give PhCl, which is then hydrolysed by H_2O at 500° to PhOH and HCl; the HCl is recovered by the process of B.P. 387,832 (B., 1933, 297) and recirculated, and the PhOH is extracted from the aq. solution by the C_6H_6 used in the first stage. Economy of heat is claimed. H. A. P.

Manufacture of dihydroxyfluoranthene and its dialkyl ethers. I. G. FARBERIND. A.-G. (B.P. 411,530, 9.12.32. Ger., 11.12.31).—Sulphonation of fluoranthene (conc. H_2SO_4 at 0–15°) and fusion of the product with NaOH gives the $4:11\text{-(OH)}_2$ -derivative, m.p. 250° [Me_2 ether, m.p. 157° (Me_2SO_4)]. H. A. P.

Catalytic oxidation of crude anthracene [to anthraquinone]. A. O. JAEGER, Assr. to SELDEN RESEARCH & ENG. CORP. (U.S.P. 1,926,540, 12.9.33. Appl., 28.3.31).—Crude commercial anthracene (1 pt.) (e.g., 30–45%, containing material proportions of carbazole and phenanthrene) and air (containing > 5 pts. of O_2) are passed over a vanadate catalyst (of Fe or Fe–Mn) containing a compound of an alkali or alkaline-earth metal (at 340–440°). H. A. P.

Manufacture of benzanthrone. A. O. JAEGER and L. C. DANIELS, Assrs. to SELDEN Co. (U.S.P. 1,931,847, 24.10.33. Appl., 17.8.29).—The benzanthrone condensation is applied to crude anthraquinone (I) and its derivatives, prepared from crude phthalic anhydride (direct from the converter). The claims cover (I) only. H. A. P.

Preparation of substituted thiazoles or selenazoles. J. D. KENDALL, and ILFORD, LTD. (B.P. 410,088, 31.10.32).—*o*-Halogenonitroaryls, free from other substituents *ortho* to halogen, are converted into disulphides or diselenides, which are reduced by consecutive action of Na_2S or NaHS and $\text{Na}_2\text{S}_2\text{O}_4$ to *o*-amino-thio- or -seleno-phenols; these are isolated and converted into thiazoles or selenazoles by heating with an org. acid or its derivatives in the usual way. Thus 4-bromo-5-nitroveratrole is converted by Na_2S_2

in aq. EtOH into $2:2'\text{-dinitro-4:5:4':5'-tetramethoxy-diphenyl disulphide}$, m.p. 219°, which is reduced with Na_2S and $\text{Na}_2\text{S}_2\text{O}_4$ to the thiophenol, m.p. 135–141°, which with Ac_2O at the b.p. gives $4:5\text{-dimethoxy-1-methylbenzthiazole}$, m.p. 71°, b.p. 188°/10 mm. Other examples include the prep. of $4:5\text{-methylenedioxy-}$, m.p. 124°, 4-dimethylamino- , m.p. 85–86°, and $4\text{-diethylamino-1-methylbenzthiazole}$, b.p. 205–225°/10 mm., and $4:5\text{-methylenedioxy-1-methylbenzselenazole}$, m.p. 140°, b.p. 248°/35 mm. H. A. P.

Treating fused material. Distilling dry-cleaners' solvent.—See I.

IV.—DYESTUFFS.

Anthraquinone azo compounds. VIII. Monoazo dyes from H-acid. IX. Primary disazo dyes from H-acid. T. MAKI and O. SUZUKI (J. Soc. Chem. Ind., Japan, 1934, 37, 227–230 B, 230–233 B; cf. B., 1933, 741).—VIII. Red- to brown-violet acid wool (and silk) dyes are prepared by coupling diazotised 1-amino-anthraquinone-5-, -6-, -7-, and -8-sulphonic acids with H-acid both in alkaline (NaOH) (I) and acid (HCl) (II) media, the shades being somewhat deeper in the latter case. Derivatives of the β -sulphonic acids have the better affinity.

IX. Disazo acid wool dyes are described from (II) and diazotised *p*-nitroaniline (III) (NaOH medium) (bluish-green), from (I) and (III) (HCl medium) (greenish-black), and from (II) and the above anthraquinonesulphonic acids (grey-blue). As before, those from the β -sulphonic acids have the better affinity. All have direct cotton affinity which is most marked in the first two classes. H. A. P.

Naphthol colours. I. Chemical constitution of Naphthol AS-ITR and AS-LT. S. UENO and T. SUZUKI (J. Soc. Chem. Ind., Japan, 1934, 37, 233–234 B).—Naphthol AS-ITR, m.p. 197°, is hydrolysed by 50% aq. NaOH at 200° to 5-chloro-2:4-dimethoxyaniline, m.p. 91° (*Ac* derivative, m.p. 140°), and 2-hydroxy-3-naphthoic acid (I), of which therefore it is the 5-chloro-2:4-dimethoxyanilide. Naphthol AS-LT, m.p. 194°, is similarly hydrolysed to (I) and 4-methoxy-*o*-toluidine (*Ac* derivative, m.p. 133°) and is therefore 2-hydroxy-3-naphthoic 4-methoxy-*o*-toluidide. These constitutions were confirmed by synthesis from the acid and amine. H. A. P.

Quinoline-yellows. I. Sulphonic acids of quinophthalone and 6-ethylquinophthalone. S. UENO and T. SUZUKI (J. Soc. Chem. Ind., Japan, 1934, 37, 234–235 B).—Quinophthalone was converted into its mono-, di-, and tri-sulphonic acids by 25% oleum at 50–60° for 6–8 hr., 120° for 1 hr., and 180° for 2 hr., respectively. 6-Ethylquinophthalone, m.p. 235°, from 6-ethylquinaldine [$(\text{B}\cdot\text{HCl})_2\cdot\text{ZnCl}_2$, m.p. 168.5–169°], is similarly converted into mono-, di-, and tri-sulphonic acids. All are isolated as Na salts. All have good affinity for wool, but only the monosulphonates possess marked affinity for silk. The disulphonates are the fastest to light of the series when dyed on wool in admixture with Patent Blue V. H. A. P.

Fastness of dyes to ultra-violet light, and a method for its determination. G. A. BRAVO (I'Ind.

Chimica, 1934, 9, 313—319, 461—468).—The resistance of a large no. of commercial dyes to fading when exposed to Hg-vapour lamp radiation has been determined, and the results are compared with the recorded fastness to sunlight. The two series are closely parallel. A method is described for determining colour fastness in which the % reflexion (I) at a no. of wave-lengths is compared photometrically with the corresponding val. for a BaSO₄ surface. By plotting (I) against λ the colour change during fading may be quantitatively studied. In practice, useful results may be obtained by using light filters of ranges $\lambda = 6000\text{--}8000, 5100\text{--}5700$, and $4300\text{--}4850$ Å., respectively. H. F. G.

Fast green wool dye. Cu in textile [dyes].—See VI.

See also A., July, 765, Azo dyes and diazo-oxy-compounds. 775, Substantive dyes of the β -diketone series. 790, Identification of org. compounds.

PATENTS.

Manufacture of chlorinated derivatives of indanthrene. J. H. CROWELL, Assr. to NAT. ANILINE & CHEM. CO., INC. (U.S.P. 1,931,646, 24.10.33. Appl., 6.1.32).—Indanthrene and its derivatives are chlorinated in 85—100% (93—95%) H₂SO₄ at 15—50° (35°). The product is reduced if necessary to the dihydroazine. Use of the lower temp. is claimed to give brighter products. H. A. P.

Manufacture of dye [dispersions]. G. W. MILES, Assr. to CELANESE CORP. OF AMERICA (U.S.P. 1,926,106, 12.9.33. Appl., 19.3.30).—Dispersions of cellulose acetate dyes are prepared with the aid of (aq.) extracts of straw (made under pressure, e.g., at the b.p./100 lb. per sq. in.) in conjunction, if desired, with other dispersing agents, e.g., bentonite, Turkey-red oil. H. A. P.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Sulphur in wool. A. T. KING (J. Text. Inst., 1934, 25, p 33—42).—A review. Spirality of knitted web can be eliminated by treatment with cold aq. Na₂S. This reduces the cystine disulphide linkings and thereby enables the peptide chains to move apart and uncoil. When the Na₂S is removed by washing, re-oxidation occurs and the fabric is reset in the straight position by the formation of fresh cross-linkings. A. G.

Scouring of wool fibre. III. Effect of alkali. H. SOBUE and S. MASUYAMA (J. Soc. Chem. Ind., Japan, 1934, 37, 204—205 B; cf. B., 1933, 780).—When wool is scoured with aq. Na₂CO₃ the max. amount of grease is removed at a concn. of 2N, but when Na₂CO₃ is added to 0.3% Na oleate the optimum concn. is 0.03N. A. G.

Scouring of pile fabrics. B. S. HILLMAN (Rayon and Melliand Text. Month., 1934, 15, 122—125, 197—198, 206, 243—244).—Methods and machinery suitable for cotton, wool, rayon, and silk fabrics are described; they are designed to avoid matting of the pile surface. A. J. H.

Crêpes. I. Theoretical form of a single yarn which creates crêpe effect. Y. KONISI (J. Soc. Chem. Ind., Japan, 1934, 37, 205—206 B).—From mathematical

considerations it is concluded that, after crêping, a crêpe yarn forms a circular helix. A. G.

Wax content of Indian cottons with special reference to their feel. N. AHMAD and D. L. SEN (J. Text. Inst., 1934, 25, p 150—155).—The wax contents of 11 varieties of Indian cottons ranged from 0.229 to 0.468%, that of the exotic Punjab-American being the highest. There is a general correlation between wax content and feel. A. G.

Oilskins. J. MILLIGAN (J. Oil Col. Chem. Assoc., 1934, 17, 201—213).—The return of a dry oilskin to a sticky condition ("come-back") is a different phenomenon from the slight tackiness sometimes found in new oilskins, due to incomplete drying. Fresh oilskins pigmented with C-black, on extraction with Et₂O, give a clear extract, but those which have come-back give an extract charged with C. Come-back is retarded by keeping oilskins hung in cool, dry air rather than folded or packed. High-temp. drying produces oilskins more stable in this respect. These observations are accounted for by some form of hydrolysis. G. H. C.

Determination of textile fibres. K. YAMADA and T. NOGUCHI (J. Soc. Chem. Ind., Japan, 1934, 37, 203 B).—The best solvents are Ca(SCN)₂ for silk, cuprammonium for viscose and cuprammonium rayons, and 2% aq. NaOH for wool. A. G.

Photometer of special application to routine textile measurements. R. E. V. HAMPSON and H. W. RICHARDS (J. Text. Inst., 1934, 25, p 106—121).—Light, interrupted 512 times per sec., falls on the textile surface to be examined and on a standard surface, and, after diffuse reflexion, enters two Cu₂O photo-cells. The alternating components from the photo-cells are balanced against each other and, after amplification, the difference is fed to headphones or to an a.c. voltmeter. Measurement is by a null method, the aperture of the standard surface being adjusted, and colour filters may be used in the incident light. A. G.

Rate of formation of the crystalline structure of [mature] wood fibres. G. J. RITTER and C. W. STILLWELL (Paper Trade J., 1934, 98; T.A.P.P.I. Sect., 277—280).—The rate of formation has been examined by X-ray diffraction patterns of specimens of known age. Fibres in radial growth in white fir reach maturity in the preferred orientation of their cellulose crystallites (C) in about 10 days. C in the terminal growth are randomly oriented up to about 4 years. Preferred orientation of C of fibres formed by radial growth of branches seems to depend both on their age and on their distance from the growing tip and the pith. Wide variations in diffraction patterns occur in fibres from different parts of the same branch. H. A. H.

Rinman alkaline pulping [recovery] process [for wood]. S. A. FAHLGREN (Paper Trade J., 1934, 98; T.A.P.P.I. Sect., 280—281).—A summary of the method of alkalisng soda-pulp waste liquor to render it suitable for dry distillation. H. A. H.

Manufacture of rayon wood pulp. S. WANG (Rayon and Melliand Text. Month., 1934, 15, 227—230).—The production of sulphite pulp from tree-log

to sheets of pulp is described; a process flow-sheet is given. A. J. H.

Dissolution of chemically modified cotton-cellulose in alkaline solutions. I. In solutions of sodium hydroxide, particularly at temperatures below the normal. G. F. DAVIDSON (J. Text. Inst., 1934, 25, T 174—196).—The solubility (I) (fraction dissolved under standard conditions) of modified cotton-cellulose (II) in aq. NaOH increases, and the [NaOH] giving max. (I) decreases, with falling temp.; thus the max. (I) for a hydrocellulose at 15°, 0°, and -5° were 8.2, 57.5, and 82.6% at 3.0, 2.75, and 2.5N, respectively. When pressure-boiled with dil. (e.g., 1%) NaOH (II) lose wt., but the residues are nevertheless more sol. in NaOH at -5°, especially for cotton oxidised with NaOCl. Previous swelling in 5N-NaOH reduces the (I). (I) increases with increasing fluidity of (II), but at equal fluidities hydrocelluloses (III) prepared from mercerised cotton are less sol. than those from unmercerised cotton. Oxycelluloses are more sol. than (III) of the same fluidity, but this difference is removed by boiling with dil. NaOH. By extractions under graded conditions (III) may be separated into fractions of different fluidities. There is a general similarity between the dissolution of (II) and the swelling of unmodified cotton, and most of the observations are explained by assuming that cellulose acts as a weak acid, that modified cottons consist of mixtures of chain mols. of different lengths, that the average length decreases with increasing modification, that the tensile strength, fluidity, and solubility are functions of the chain-length frequency distribution, that chain mols. are dissolved when the cohesive forces binding them to their neighbours are overcome by swelling forces, and that the shorter mols. are the more easily detached. A. G.

High-speed viscose [rayon] spinning and washing. J. WALOUCH (Rayon and Melliand Text. Month., 1934, 15, 169—171).—Difficulties met with, and means for overcoming them, in increasing the rate of spinning (bobbin method) from 70 to 100 m./min. are described. Viscose prepared with much less CS₂ than usual yields a satisfactory rayon free from broken filaments when spun at the higher rate, but it yields a "fuzzy" rayon when spun at about 45 m./min. A "closed-circuit" method for tapping viscose pipe-lines is described, whereby wastage and hardening of the viscose are avoided. The suction is preferred to the pressure high-speed rayon-washing systems, but it is necessary for the wash-H₂O to have > 5° of hardness. A. J. H.

Acetylation of cellulose fibres. E. ELÖD, H. SCHMID-BIELENBERG, and L. THORIA (Angew. Chem., 1934, 47, 465—468).—The rate of acetylation decreases in the order cotton, ramie, hemp, flax, which is the order of increasing orientation of the micelles. The rate also increases with increasing preliminary swelling, with corresponding increases in mol. wt. and in the tensile strengths of films of the primary and secondary acetates. A. G.

Ultramicroscopical study of cellulose nitrate digested under pressure. K. ATSUKI and N. KATO (J. Soc. Chem. Ind., Japan, 1934, 37, 200—201 B).—

After digestion with H₂O at 130° for 1—6 hr. cellulose nitrate (12.53% N) contains less N (12.26% after 6 hr.), has a lower η , and yields fewer ultra-microscopically visible particles when H₂O is added to a dil. solution in COME₂. A. G.

Sensitive instrument for measuring the air-permeability of paper and other sheet materials. F. T. CARSON (Bur. Stand. J. Res., 1934, 12, 567—585).—The air flow under a controlled pressure is measured with a capillary flowmeter. Constructional details are recorded. The method may be applied to leather. H. J. E.

Effect of experimental conditions on measurement of air-permeability of paper. F. T. CARSON (Bur. Stand. J. Res., 1934, 12, 587—608; cf. preceding abstract).—Data for papers and fibre boards of various types are recorded. The flow resembles that of a gas through a long capillary tube, the air passages in paper behaving as a group of capillaries of average length many times > the paper thickness. H. J. E.

[Determination of] acidity in paper. G. C. CHASE (Paper Trade J., 1934, 98; T.A.P.P.I. Sect., 282).—It is claimed that good duplication between the *p*_H of the white-H₂O (I) below the machine wire and of the finished paper is obtained if the (I) is first boiled and cooled. H. A. H.

Photochemical reaction of cellulose. I. Effect of light on the copper number of cellulose (filter paper). S. OGURI (J. Soc. Chem. Ind., Japan, 1934, 37, 201—202 B).—The Cu no. of filter paper is raised by exposure to sunlight or to the rays from a Hg-vapour lamp, but the effect is diminished by wetting with H₂O or with aq. NaOH. A. G.

Microscopical and micrographic tests for paper. M. MATTHIS (Ann. Chim. Analyt., 1934, [ii], 16, 49—57, 97—112, 145—158; cf. B., 1933, 270).—The colour reactions of 10 fibres used in papermaking are classified and tabulated for the following reagents: I in aq. KI; Herzberg's stain; Vétillard's stain (40 c.c. of glycerol + 20 c.c. of H₂O + 50 c.c. of H₂SO₄, added to I in aq. KI); saturated aq. MgCl₂ + I in aq. KI; 2% aq. NH₂Ph.H₂SO₄; 0.5% methylene-blue; 8% phloroglucinol in 15% HCl. Details of technique are given. The microscopical characteristics, papermaking qualities, and methods of prep. of the following papermaking fibres (used mainly for insulating papers) and of the pulps made from them are described and illustrated (mean fibre lengths given in mm.): ordinary (0.019) and Manila (0.020) hems, flax (0.017, provides suppleness and tensile strength), cotton 0.025 (I), rye, straw (0.015, used for hardness, particularly in writing papers), esparto (for suppleness), and jute (used for wrappings and cheaper papers on account of its poor bleachability). The materials are best prepared for the microscope by digestion for 5 min. with 4% aq. NaOH at room temp. followed by dilution to 0.7% and boiling for 5 min., washing, and, if necessary, disintegration by hand with needles; many of the diagnostic microscopical characters of the fibres disappear when they are made into paper. (I) provides suppleness but is sometimes objectionable for electrical papers on account of the formation of knots; unbleached (I) is recognised by the red colour

produced with 50% Ru-red. Descriptions and photographs of transverse and longitudinal sections of pine (fibre length 0.020–0.039 mm.), beech, and poplar woods are also given. The fibre content of a paper may be determined by measuring for a no. of fields, enlarged by a projector, the total length of each type of fibre which, when multiplied by the characteristic mean length of each fibre (cf. above), gives the surface of each type present; this may be calc. as a % of the whole, but the result takes into account only the fibrous constituents of the paper. J. G.

Optical properties of paper. S. A. STAEGE (Paper Trade J., 1934, **98**; T.A.P.P.I. Sect., 300–301).—The Westinghouse Trans-O-Meter is described. H. A. H.

Adsorption of zinc chloride by cornstalk insulating board pulp. L. K. ARNOLD and D. L. GLEAVES (Paper Trade J., 1934, **98**; T.A.P.P.I. Sect., 297–299).— ZnCl_2 is added to insulating board stock to retard attack by moulds and insects. The results obtained by some methods of determining the total amount of ZnCl_2 retained by adsorption and by evaporation of white- H_2O on the drying cylinders are discussed. H. A. H.

Waste wood.—See IX. **Cotton.**—See XVI. **Flax-retting wastes.**—See XXIII.

See also A., July, 727, **Sorption of H_2O vapour by cellulose acetate.** 731, **Action of alkaline Cu solution on silk fibroin.** 790, **Identification of org. compounds.**

PATENTS.

Manufacture of cellulose. J. J. DE LA ROZA, SEN. (U.S.P. 1,931,575, 24.10.33. Appl., 10.10.29).—Vegetable fibre (I) (cornstalks, straws, grasses, and particularly sugar cane) is treated with an acid solution (II) [conc. aq. SO_2 containing ≤ 12 pts. of SO_2 per 100 lb. of dry (I)] first at room temp. and atm. pressure and, after storing, again with (II) at $< 110^\circ$ under pressure. It is then washed with hot H_2O and subjected to a no. of alkaline treatments (solutions of Na, K, Ca, or Mg compounds or waste alkaline liquors) first at atm. pressure below the b.p., and subsequently at higher pressure above the b.p.; the product is of high α -cellulose content and low in ash. F. R. E.

Preparation of cellulose xanthate from sheeted cellulose fibre. G. A. RICHTER, ASSR. to BROWN CO. (U.S.P. 1,932,751, 31.10.33. Appl., 11.9.31).—Cellulose pulp, e.g., short-fibred wood pulp from poplar and hardwoods, is treated with excess of 18% NaOH solution containing an oxidant, e.g., hypochlorites or peroxides, at $\leq 40^\circ$, whereby disintegration is avoided; the substantially unmercerised sheets are then removed from the solution, cooled to a temp. (about 20°) at which mercerisation is effected, and xanthated. F. R. E.

Production of new compositions of matter by esterification of cellulosic material. CELLULOSE ACETATE SILK CO., LTD., and V. E. YARSLEY (B.P. 411,501, 3.11.32).—After acetylation of cellulosic material (I) until the reaction approaches or reaches peak temp., more (I) is added in excess of the residual acetylating agent present so that the final product consists of a mixture of completely and superficially

acetylated cellulose, the latter being uniformly distributed throughout the mass; the reaction may be carried out in presence of an org. solvent or non-solvent diluent. The product in admixture with solvents, plasticisers, and fillers yields plastic compositions of increased strength. F. R. E.

Stabilisation of organic esters of cellulose. O. SINDL (B.P. 411,260, 24.3.33. Ger., 24.3.32).—The compressed ester (I) made by the non-solvent method of esterification is treated on the countercurrent principle and at the b.p. with ≤ 1 alkyl ester (EtOAc) and a fatty acid (AcOH), in presence of a diluent (C_6H_6) which is preferably a swelling agent for the (I) and may have been used as the non-solvent in its production, whereby the catalyst (H_2SO_4) and/or its compounds with cellulose or its degradation products are removed. F. R. E.

(A) **Solvent [for cellulose esters].** (B) **[Cellulose] ester solvents and compositions.** G. H. BUCHANAN, ASSR. to AMER. CYANAMID CO. (U.S.P. 1,926,510–11, 12.9.33. Appl., [A] 20.1.27, [B] 25.2.30).—Cellulose ester (nitrate) compositions containing (A) esters of isobutyric acid (I) and higher homologues ($\text{OH}\cdot\text{CMe}_2\cdot\text{CO}_2\text{Et}$), and (B) Pr, Bu, and amyl esters of (I), are claimed. H. A. P.

Purifying spun cellulose products. H. P. BASSETT (U.S.P. 1,933,204, 31.10.33. Appl., 30.9.30).—Viscose or nitrocellulose materials are desulphurised or denitrated, respectively, by treatment with approx. 4% of aq. $(\text{NH}_4)_2\text{S}$ and $\leq 1\%$ of aq. NH_3 . F. R. E.

Desulphurising of rayon in package form. H. B. KLINE, ASSR. to INDUSTRIAL RAYON CORP. (U.S.P. 1,932,789, 31.10.33. Appl., 20.3.30).—The bobbins etc. of rayon are treated with aq. $(\text{NH}_4)_2\text{S}$ containing aq. NH_3 in such quantity that the effect on and contamination by the materials composing the desulphurising apparatus and the rayon holders (Fe and Al) is minimised. F. R. E.

Production and treatment of natural and artificial filaments, threads, foils, and similar materials. BRIT. CELANESE, LTD., W. A. DICKIE, R. W. MONCRIEFF, and C. W. NORTH (B.P. 411,094, 28.10.32).—During the treatment of the materials (I) with a liquid medium (II) containing a volatile constituent (COMe_2 , dioxan, methylene ethylene ether, CH_2Cl_2 , NH_3) the surface of the (II) is covered with a layer of immiscible liquid (paraffin oil) which is prevented from coming in contact with (I) at their points of entry into and withdrawal from the (II). F. R. E.

Treatment [to increase the tensile strength] of artificial filaments, yarns, threads, etc. BRIT. CELANESE, LTD., H. DREYFUS, and W. I. TAYLOR (B.P. 411,502, 3.11.32. Addn. to B.P. 371,461; B., 1932, 676).—Regenerated cellulose filaments are drawn in the form of a warp from one or more packages, treated with a softening agent (I) (Schweitzer's reagent, ZnCl_2 , H_2SO_4), and the warp as a whole is stretched so as to increase the filament length ≤ 5 times. The (I) is then removed after relaxing the tension. F. R. E.

Application of fibrous coatings to filaments. BRIT. THOMSON-HOUSTON CO., LTD., ASSEES. OF E. H. LEWIS and B. W. LUTTENBERGER (B.P. 411,731, 14.10.33.

U.S., 14.10.32).—The filament (I) (wire) is passed longitudinally without rotation through a mass of the intermingled, non-parallel fibres (asbestos), to which a rotation is imparted about (I). F. R. E.

Manufacture of staple fibre yarns from continuous filaments. H. DREYFUS (B.P. 411,506, 10.11.32 and 8.3.33).—After breaking continuous filaments of org. derivatives of cellulose by stretching them beyond the limit of their extensibility (*E*), the staple fibre is spun into yarn and conditioned in package form by treatment with a shrinking and/or softening agent (steam, hot soap solutions, org. liquids such as CH_2Cl_2 in C_6H_6 , AcOH , COMe_2 , etc.) to restore, at least in part, the *E* lost during the breaking operation. F. R. E.

Production of [moistureproof] sheet [wrapping] materials containing cellulose esters or ethers. BRIT. CELANESE, LTD. (B.P. 411,471, 5.12.32. U.S., 3.12.31).—A H_2O -free solution of the ester or ether (I) in a volatile solvent (II), e.g., COMe_2 , together with a difficultly volatile, H_2O -miscible substance (diacetin, Me_2 tartrate) having a solvent action on the (I) is sheeted and the (II) removed by evaporation. F. R. E.

Transparent cellulose film [glass substitute]. J. F. WALSH, ASSR. to CELLULOID CORP. (U.S.P. 1,931,518, 24.10.33. Appl., 29.7.29).—A reticular material (textile or metal fabric) is covered with a transparent cellulosic plastic, permeable to ultra-violet light, consisting of cellulose acetate 100, an aromatic phosphate (Ph_3PO_4) 10–20, and an ester of tartaric acid (Bu tartrate) 10–20 pts., with the aid of a solvent (COMe_2 - EtOH). F. R. E.

Fibrous mixings containing rubber. G. E. HEYL (B.P. 411,265, 29.3.33).—A fibrous mixture consisting of fibre and coagulated rubber is made capable of being extruded or sheeted by addition of 1–50% of rubber latex and a finely-ground porous filler, composed of wood dust from rubber trees. F. R. E.

Keto-alcohol [pyroxylin solvent].—See III. Cellular composition.—See IX. Fertilisers from cellulosic materials.—See XVI.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Bleaching of vegetable fibres. W. KIND (Chem.-Ztg., 1934, 58, 537–539).—A review of recent developments.

Importance of copper in textile technology. A. H. PETTINGER (Amer. Dyestuff Rep., 1934, 23, 309–312, 332).—A review. A. J. H.

Fast green wool dye from Schäffer's salt. N. A. SICHRA and S. G. ABRAMOVITSCH (Anilinokras. Prom., 1934, 4, 167–168).—Wool is soaked in a solution of the NO-derivative of 2 : 6- $\text{OH}\cdot\text{C}_{10}\text{H}_6\cdot\text{SO}_3\text{H}$, and a mixture of HCO_2H and FeSO_4 is added, when naphthol-green B is deposited in the fibres. R. T.

Absorption of tannic acid by viscose silk. IV. Effect of addition of hydrochloric and acetic acids to the bath. (Supplement.) V. Further investigations on the cooling of baths. K. HISHIYAMA and K. MIYASAKA (J. Soc. Chem. Ind., Japan, 1934, 37, 202B, 202–203B; cf. B., 1933, 744).—IV. Addition of

HCl or AcOH has no effect on the absorption of tannic acid (I).

V. When the duration of steeping in the cooling (I) bath is very long the initial temp. has little effect on the absorption, but in practical dyeing when the duration is 2–3 hr. the initial temp. is important, and 60° is recommended. A. G.

Determining fastness of dyes.—See IV. Oilskins.—See V. Electrodialyser.—See XI.

PATENTS.

Treating [bleaching] artificial [viscose] thread. T. F. BANIGAN, ASSR. to DU PONT RAYON Co. (U.S.P. 1,931,245, 17.10.33. Appl., 28.2.30).—Corrosion of the Al or Al alloy carriers for viscose yarn cakes is prevented by addition to the NaOCl bleach liquor (0.05–0.2% of available Cl_2 and 0.02–0.10% of alkalinity, expressed as NaOH) of 0.02–0.20% of Na_2SiO_3 . A. J. H.

Dyeing of animal fibres with metal complex compounds of organic acid dyes. I. G. FARBERIND. A.-G. (B.P. 411,474, 7.12.32 and 29.3.33. Ger., 7.12.31).—Less acid is needed (and HCO_2H may be used instead of H_2SO_4) if a H_2O -sol. protective colloid, e.g., glue, starch, dextrin, sulphite-cellulose pitch, or polyethylene glycol derivatives of fatty OH - or NH_2 -compounds (2–10%), is added to the bath. H. A. P.

Printing with the aid of stable reduction compounds of [indigoid] vat dyes. I. G. FARBERIND. A.-G. (B.P. 411,332, 1.9.33. Ger., 1.9.32. Addn. to B.P. 334,907; B., 1931, 59).—Use in textile printing of stable reduction products of halogenated indigoid dyes (5 : 7 : 5' : 7'-tetrachloroindigo (cf. B.P. 395,183; B., 1933, 909) is claimed. H. A. P.

Mercerisation of vegetable fibres. A. CARPMAEL. From I. G. FARBERIND. A.-G. (B.P. 410,164, 9.11.32).—Addition to mercerising baths of amides of dithiocarbonic acid obtained by interaction of CS_2 and *sec*-alkylamines containing a chain of $\leq \text{C}_3$ (in presence of aq. alkali) is claimed. Examples are dithiocarbamates from NHPr^a_2 , NHBu^a_2 , and $\text{NHBu}^a\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{OH}$. Products from di-*sec*-diamines, e.g., di-*n*-ethyl-, b.p. 100–105°, and di-*n*-butyl-ethylenediamine, b.p. 116–120° (by reduction of the azomethines from Pr^aCHO and NH_2Et and NH_2Bu^a , respectively), are specifically claimed. H. A. P.

[Artificial silk] filament treatment [delustring]. F. HOELKESKAMP, ASSR. to AMER. BEMBERG CORP. (U.S.P. 1,932,734, 31.10.33. Appl., 16.12.31. Ger., 16.3.31).—A H_2O -insol. metal salt, e.g., BaSO_4 , is pptd. together with a H_2O -repellent metal hydroxide, e.g., $\text{Al}(\text{OH})_3$, on the filaments. E.g., the filaments are successively treated with solutions of $\text{Ba}(\text{OH})_2$ and $\text{Al}_2(\text{SO}_4)_3$, and are then further treated with a wax-soap emulsion. A. J. H.

Rubberised and vulcanised fabrics and like products. FILASTIC, LTD. From J. E. C. BONGRAND and L. S. M. LEJEUNE (B.P. 411,460, 6.12.32).—Articles formed, e.g., by weaving or braiding, from thread or yarn which has been impregnated and surrounded with rubber by immersion in an aq. dispersion under pressure, are treated with a rubber dispersion so that the stress-strain characteristics of the additional rubber are

substantially the same as those of the rubber within and around the threads. The additional rubber may desirably be ≤ 40 wt.-% of the impregnated yarn and may contain sufficient vulcanising agents for itself and the rubber already present. D. F. T.

Loading centrifugal extractor. Distilling dry-cleaners' solvent.—See I. Sulphonic acids.—See III.

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

Contact sulphuric acid manufacture. II. Influence of arsenic on activity of the barium-vanadium catalyst. M. MATSUI, K. ODA, and T. OKAI (J. Soc. Chem. Ind., Japan, 1934, 34, 169 B; cf. B., 1934, 15).—Quantities of As_2O_3 up to 15% added to the V_2O_5 used in the contact process for H_2SO_4 do not affect the yield. R. S. B.

Communication between the chambers in sulphuric acid plant. P. GUARESCHI (L'Ind. Chimica, 1934, 9, 470–475).—Conditions governing the design and positioning of the pipes leading from one chamber to another in Pb-chamber plant are discussed in relation to the efficiency of the plant. H. F. G.

Effects of addition of common salt during calcination of limestone. I. Reaction of chlorine and gaseous hydrogen chloride on iron in lime. T. NODA (J. Soc. Chem. Ind., Japan, 1934, 34, 171 B; cf. B., 1933, 746).—The effect of Cl_2 and HCl on CaO are correlated with the action, on the calcination of CaO, of NaCl, which gives HCl or Cl_2 in moist air at high temp. Cl_2 (0.02–0.05 atm.) and HCl (0.1–0.4 atm.) passed over $CaCO_3$ containing 0.59% Fe at 600° give a 50% conversion into $CaCl_2$ in 3 hr. with little loss of Fe, and an almost complete conversion in 6 hr., with 40% of the Fe volatilised. H_2O and C favour the reaction. At 1000° in 4 hr. pure $CaCl_2$ free from Fe is obtained. R. S. B.

Thermal effects produced on fouling iron oxide and iron oxide-slaked lime mixtures with hydrogen sulphide. W. A. DAMON (70th Ann. Rept. on Alkali etc. Works, 1933, 29–36).—Laboratory measurements with a calorimeter showed that more heat is liberated by the fouling of bog ore- $Ca(OH)_2$ mixtures with dry H_2S than with either reagent separately, and very much more during revivification with air. A 30:70 $Ca(OH)_2$ -bog ore mixture gave max. heat liberation and max. H_2S absorption. Heat liberation increases if the H_2O content falls below 30%, the optimum content for H_2S absorption for bog ore. Dry $Ca(OH)_2$ is not an absorbent of H_2S . After one fouling and revivification the heat liberated on further use by the 30:70 mixture is much $<$ with bog ore alone, as is the absorption. Analysis of the products shows that $Ca(OH)_2$ absorbs S principally as CaS_2O_3 , though free S is not entirely absent. With mixtures secondary reactions result in conversion of free S into CaS_2O_3 and explain the increased thermal effect on revivification. The use of the mixture is considered inadvisable in view of the increased risk of ignition. C. I.

Extraction of alumina from silicates by sulphuric acid. Y. KATO, K. FUNAKI, and R. YAZIMA (J. Soc.

Chem. Ind., Japan, 1934, 34, 169–170 B).—Decomp. of Al silicate by conc. H_2SO_4 followed by extraction with H_2O gives $Al_2(SO_4)_3 \cdot 18H_2O$, from which pure Al_2O_3 may be prepared (methods not described). R. S. B.

Treatment of alum with ammonia solution. under pressure. T. ARIMORI (J. Soc. Chem. Ind., Japan, 1934, 34, 170 B).—Finely-divided NH_4 alum reacts with hot. conc. aq. NH_3 under pressure before it can dissolve, giving pure cryst. $Al(OH)_3$. With aq. $NH_3 > 3N$ or in amount < 1.5 times that equiv. to the $Al(OH)_3$ a granular ppt. is obtained. The purity of the ppt. depends on the reaction temp., the reaction time, and the fineness of the alum. Conc. aq. NH_3 saturated with $(NH_4)_2SO_4$ at room temp. gives granular $Al(OH)_3$. Applications to industry are discussed. R. S. B.

Rapid analysis of mixtures of alum, calcium oxide, and calcium carbonate. P. CHRISTOL and J. FOURCADE (Ann. Chim. Analyt., 1934, [ii], 16, 202–206, 241–249).—3–5 g. of mixture are distilled with excess of saturated $H_2C_2O_4$. The evolved CO_2 is absorbed in standard alkali, which is then titrated (Poirrier-blue) with acid. All of the Ca is pptd. as oxalate, filtered off, and titrated, and the alum in the filtrate is determined as $BaSO_4$ and Al_2O_3 . The Ca and alum found are 2% and 1% low, respectively, and the CO_2 is better determined as $BaCO_3$ by absorption in ammoniacal $BaCl_2$. The determination of impurities in commercial samples is described. J. G. A. G.

Purification of manganese dioxide. H. IDA (J. Soc. Chem. Ind., Japan, 1934, 34, 168–169 B).— MnO_2 for use in dry cells is purified by treatment with hot dil. acid followed by electrodialysis. In the latter process an a.c. is applied across the d.c. and disturbs impurities which are carried away by the d.c. The dry cell containing this MnO_2 has a long life and a low internal resistance. R. S. B.

Catalyst for production of hydrogen by means of the water-gas reaction. XV. Preparation of the catalyst. R. YOSHIMURA and S. SUGIMOTO (J. Soc. Chem. Ind., Japan, 1934, 37, 182–183 B; cf. B., 1933, 426).—By heating compressed pastilles of powdered Fe_2O_3 and Cr_2O_3 , containing 10 mol.-% of the latter, at 450° for 10 min. a catalyst was produced the activity of which, unlike that of Fe_2O_3 alone, was permanent. X-Ray examination showed that a solid solution of Cr_2O_3 in Fe_2O_3 had been produced. A similar effect was produced by moistening the pastilles and heating them at 300–350° for 70 hr. A sample of natural Fe_2O_3 also maintained its activity longer than the prepared product. A. B. M.

H_2SO_4 recovery in gasworks.—See II. Acid-resistant (etc.) ceramic ware.—See VIII. [P from] fused cement.—See IX.

See also A., July, 738, Synthesis of NH_3 . 741, Prep. of distilled H_2O , carbonate-free NaOH, pure anhyd. Na_2CO_3 , phosphorescent Be nitride. 743, Analysis of gases. 744, Determination of halogens and of sulphide-S. 745, Sensitive reaction for H_3BO_3 . 748, Liquefaction of He. 750, Determining He in gases. 752, Rare gases of sub-soil of Lille. 758, [Pt catalyst for] reduction reactions.

PATENTS.

Apparatus for synthesising ammonia. W. H. KNISKERN, Assr. to ATMOSPHERIC NITROGEN CORP. (U.S.P. 1,936,167, 21.11.33. Appl., 27.6.30).—In a multistage gas-compressing system having a purifier (*P*) operating at an intermediate pressure, the compressor cylinder immediately following *P* is provided with clearance control to adjust exactly the amount of gas taken, so that *P* may operate at const. pressure.

B. M. V.

[Ammonium] sulphate dryer. J. VAN ACKEREN, Assr. to KOPPERS CO. OF DELAWARE (U.S.P. 1,936,866, 28.11.33. Appl., 18.1.32).—From a continuously discharging centrifuge (*A*) the salt is allowed to fall through an underposed tower (*B*) countercurrent to heated air, the motor and gears of *A* being kept cool by fresh air rising by convection in an axial passage within *B*.

B. M. V.

Production of leaded ammonium chloride crystals. C. P. WEISE, Assr. to GRASSELLI CHEM. CO. (U.S.P. 1,936,811, 28.11.33. Appl., 20.4.33).— NH_4Cl is cryst. from an alkaline (NH_3) solution containing Pb (0.5% of the NH_4Cl); the crystals are then treated with HCl (0.5%) or acidified NH_4Cl solution (mother-liquor) to lighten the colour.

B. M. V.

Production of tri-alkali phosphate from ferrophosphorus. N. C. LINDBERG, Assr. to VICTOR CHEM. WORKS (U.S.P. 1,936,307, 21.11.33. Appl., 27.1.32).—In the production of Na_3PO_4 as described in U.S.P. 1,888,003 (B., 1933, 834), the temp. is gradually raised by countercurrent heated gases to above the initial m.p. of the charge, but never as high as the instantaneous m.p. The reaction may start at 500–700° (600°) and finish at 1100–1250° (1200°).

B. M. V.

Catalytic production of anhydrous stannic chloride [free from stannous chloride]. J. WOLF and G. A. FAVRE (U.S.P. 1,937,419, 28.11.33. Appl., 15.6.32).— Cl_2 is blown into molten Sn containing ≤ 5 wt.-% of Sb, the Sb acting as catalyst to prevent formation of SnCl_2 .

B. M. V.

Separation of carbon dioxide from a gas mixture. A. S. ALLEN and A. MICHALSKE (U.S.P. 1,934,472, 7.11.33. Appl., 30.10.30).— CO_2 is removed from flue gases by scrubbing concurrent with an absorbent liquid under pressure, the liquid being regenerated by heating under reduced pressure. Triethanolamine (bi)carbonate is a suitable absorbent.

B. M. V.

Manufacture of hydrated solid carbon dioxide. W. S. JOSEPHSON, Assr. to DRYICE CORP. OF AMERICA (U.S.P. 1,927,175, 19.9.33. Appl., 16.10.29).—Liquid CO_2 is evaporated in presence of a mist of H_2O , whereby the CO_2 snow is condensed around nuclei of H_2O snow; the temp. of a refrigerated chamber may be regulated by the proportion of H_2O .

B. M. V.

Recovery of hydrogen. G. HORNING (U.S.P. 1,933,734, 7.11.33. Appl., 15.7.30. Ger., 20.7.29).—The H_2O used, e.g., for cleaning coke-oven gas preparatory to making NH_3 is relieved from pressure (by spraying) in two stages and the evolved gases of high calorific val. are collected, the final reduction of pressure being to < 1 atm. in presence of a scrubbing gas, e.g., a

N_2 fraction, the H_2O being thereby rendered fit for re-use. B. M. V.

Recovery of sulphur from roaster gases. R. F. BACON (U.S.P. 1,934,474, 7.11.33. Appl., 6.5.27).—All operations are conducted under elevated, substantially const., pressure. Ore is roasted with air regulated in amount to form SO_2 without excess of O_2 and the gases are passed through incandescent C, the S formed being condensed.

B. M. V.

Apparatus for regulating the temperature of gases containing sulphur trioxide and sulphuric acid. L. GILLET, Assr. to GEN. CHEM. CO. (U.S.P. 1,934,419, 7.11.33. Appl., 22.6.28).— SO_2 is oxidised to SO_3 in a no. of converters in series before and between which are heat exchangers cooled by continuously circulating currents of air, some of which is wasted and replaced by fresh air. The final cooling is regulated to the conditions described in U.S.P. 1,832,482 (B., 1932, 886).

B. M. V.

Manufacture of concentrated nitric acid. E. I. DU PONT DE NEMOURS & Co., and S. L. HANDFORTH (B.P. 407,089, 15.9.32).—See U.S.P. 1,922,289; B., 1934, 574.

Concentrating phosphate-bearing materials. PHOSPHATE RECOVERY CORP., Assees. of F. L. JOHNSTON (B.P. 409,514, 18.5.33. U.S., 2.6.32).—See U.S.P. 1,927,939; B., 1934, 575.

Pb glazes.—See VIII. Gypsum plaster.—See IX.

VIII.—GLASS; CERAMICS.

Salt glaze. I. Reaction between silica and mixed vapour of water and sodium chloride. S. KONDO and S. SUZUKI (J. Soc. Chem. Ind., Japan, 1934, 37, 173 B).—The reaction, studied by determining the Na_2O and SiO_2 contents of glassy substances produced by heating SiO_2 (for 1–5 hr. at 900–1300°) in an atm. of N_2 , H_2O , and NaCl vapour, was accelerated when small amounts of CaO or MgO were introduced into the atm.

A. L. R.

Activated clay. I. Optimum conditions for its preparation, and the characteristic decolorising curve. K. KOBAYASHI and K. YAMAMOTO (J. Soc. Chem. Ind., Japan, 1934, 37, 181–182 B).—Results of experiments on the “activation” of natural decolorising clays (I) are summarised. X-Ray studies showed that clays belonging to the family of Japanese acid clays are suitable for the prep. of activated clay (II). For the activation of (I) dil. acids (e.g., 3–6N-HCl or H_2SO_4) are suitable reagents; the optimum temp. is 105–110°, the heating time 3–5 hr., and the amount of acid used is restricted economically to twice the wt. of raw (I). A method of comparing the decolorising powers of (II) is described, based on the following formula derived from the Freundlich adsorption isotherm: $m = Ay/(100-y)^n$, where m = wt. of (II), y = % of decolorisation, and n and A are consts.

A. L. R.

Dimensional changes of clay wares during firing. III. Testing of refractory mortars. T. YOSHIOKA, T. HORIE, and J. KARASHIMA (J. Soc. Chem. Ind., Japan, 1934, 37, 172 B; cf. B., 1933, 786).—The dimensional changes of bars (60 mm. long) of refractory mortars and

cements, heated at exactly 200° per hr. to 1500° in a resistance furnace fitted with automatic temp. control, were measured at 25° intervals by means of precision telescopes sighted on the ends of the bars through mica windows in the furnace casing. No results are given.

A. L. R.

Fire-, alkali-, and acid-resistant ceramic ware. W. MIEHR (Chem.-Ztg., 1934, 58, 497—501).—A general review is given of the properties and testing of the raw materials, and of the manufacture, properties, and applications of the products. A no. of forms of SiO_2 , aluminosilicates, clays, oxides, carbides, nitrides, etc. are classified according to their resistance to high temp., alkali, and acid.

H. F. G.

Mullite in clay refractories. T. YOSHIOKA, T. HORIE, and J. KARASHIMA (J. Soc. Chem. Ind., Japan, 1934, 37, 171 B).—A method of approx. estimating the mullite (I) content of SiO_2 - Al_2O_3 refractories (II) is described. About 1 g. of the finely-ground material, after shaking with 40% HF solution at 0° for 6 hr., is poured into 2 litres of cold H_2O ; the filtered, washed, and ignited residue, which contains any corundum present in (II), is regarded as (I). Microscopical examination of this residue indicates whether (I) was originally in the raw materials used for making (II), or was developed during firing.

A. L. R.

See also A., July, 728, Application of capillary analysis [to glass]. 740, Origin of the β - and γ -ray coloration of glasses. 747, Colorimetric determination of Ti in silicates. 749, Metallised glass electrode. 752, Hydrothermal synthesis of kaolin.

PATENTS.

Continuous [glass-]tank furnace. T. C. MCKINLEY and C. A. RHONEMUS, Assrs. to LIBBEY-OWENS-FORD GLASS CO. (U.S.P. 1,937,390, 28.11.33. Appl., 26.2.23).—The feeding of two sheet-glass drawing machines from one tank being impracticable owing to temp. differences between the edges and middle, the glass from one large melting and refining pool is divided into as many parallel independent cooling and working channels as there are drawing machines.

B. M. V.

Apparatus for making glass. G. E. HOWARD, Assr. to HARTFORD-EMPIRE CO. (U.S.P. 1,937,321, 28.11.33. Appl., 16.1.33).—A glass tank is described having a flame, U-shaped in plan, turning back at the bridge wall (A), but A is protected from excessive impingement by sloping the roof (B) downwards towards A. Air is also passed through hollow spaces in A and B.

B. M. V.

Production of glass. H. M. KRANER (U.S.P. 1,933,739, 7.11.33. Appl., 2.9.31).—Claim is made for the addition of partly vitrified materials (clay, flux, and a colorant) to other glass-forming materials in a furnace.

B. M. V.

Production of laminated glass. G. B. WATKINS, Assr. to LIBBEY-OWENS-FORD GLASS CO. (U.S.P. 1,937,396, 28.11.33. Appl., 26.7.29).—The safety layer is forced while in a plastic condition between two glass plates secured at the correct distance apart.

B. M. V.

Production of lead glazes. H. J. HARKORT, Assee. of R. VASSEL (B.P. 410,602, 20.4.33. Ger., 25.4. and

28.11.32).—As sources of Pb, waste products (I) from the accumulator industry are used, e.g., (1) Pb paste, from the production of accumulator plates, (2) completely or partly oxidised Pb dust, from the pulverisation of Pb, which process may be effected so as to obtain max. oxidation. Other Pb-containing oxides and/or artificially produced Pb oxides may be added with (2), and metallic Pb in (I) may be oxidised partly or completely during fritting by PbO_2 present. (I) of different degrees of oxidation may be so mixed as to obtain a Pb content = that of Pb_3O_4 .

A. L. R.

Clay products processing machine. E. M. HOOVER (U.S.P. 1,935,319, 14.11.33. Appl., 22.1.31).—Apparatus for preheating (with waste gases) and burning clay products in separate inclined tunnels for the two stages and on separate chain conveyors is described.

B. M. V.

Production of a cellular clay body. G. A. BOLE (B.P. 411,534, 9.12.32).—A slip of clay, plaster of Paris, dolomite, and dil. H_2SO_4 is cast in the usual way.

J. A. S.

Manufacture of saggars. A. WEBER, JUN., Assr. to WEBER ELECTRIC CO. (U.S.P. 1,937,450, 28.11.33. Appl., 6.7.32).—A sagger is formed with flat upper surface, fluted walls, and concave undersurface.

B. M. V.

Manufacture of permeable ceramic products. W. L. STAFFORD, Assr. to JOHNS-MANVILLE CORP. (U.S.P. 1,934,383, 7.11.33. Appl., 21.5.31).—A body material of poor bonding quality (clay) is mixed with a volatile solid (C_{10}H_8) and a cementitious material hardening at low temp. (hydraulic cement). The articles are shaped and heated first to volatilise the C_{10}H_8 and then further to form a ceramic bond.

B. M. V.

Increasing the uniformity of abrasive and ceramic articles. R. C. BENNER, P. H. WALKER, and W. G. SOLEY, Assrs. to CARBORUNDUM CO. (U.S.P. 1,936,820, 28.11.33. Appl., 27.9.29).—The abrasive mix is transferred to the mould in an atm. of controlled humidity. Apparatus comprising a distributor screen (S), a mould (M) below S, a chamber surrounding M and S, and means for keeping the humidity of the encased atm. const. is claimed.

B. M. V.

Manufacture of grinding and abrading bodies. DEUTS. GOLD- U. SILBERSCHIEDENSTALT VORM. ROESSLER (B.P. 411,498, 6.9.32. Ger., 7.9.31).—The mould is packed with bodies (I), e.g., lumps of sugar, C_{10}H_8 , cork, etc., forming suitable predetermined interstices, which are then filled with a mixture of abrasive body and binding agent (Bakelite or ceramic material etc.). After the bond has hardened, the (I) are removed by dissolution or volatilisation, or are burned out when the article is fired if the bond is ceramic. The interstices provide fresh cutting edges and cooling spaces.

J. A. S.

Abrasive articles bonded with a synthetic resin. BAKELITE, LTD. From CARBORUNDUM CO. (B.P. 411,846, 13.12.32).—The abrasive grains and a $\text{PhOH}\cdot\text{CH}_2\text{O}$ or other potentially hardenable resin are mixed between rollers which are preferably heated and coated with a thin oil film; the wheels cut from the sheet product are indurated by heat.

S. M.

Manufacture of silicon carbide. O. HUTCHINS, Assr. to CARBORUNDUM Co. (U.S.P. 1,937,060, 28.1.33. Appl., 17.11.31).—By the use of an increased proportion of C in the sand-coke mix and higher core temp. in the furnace, a product is obtained comprising small idiomorphic crystals in an allotriomorphic matrix, both being substantially pure SiC. B. M. V.

Glass substitute.—See V.

IX.—BUILDING MATERIALS.

Fused cement. III. Synthesis of $5\text{CaO} \cdot 3\text{Al}_2\text{O}_3$ from calcium and aluminium phosphates. K. AKIYAMA (J. Soc. Chem. Ind., Japan, 1934, 37, 173 B).—Experiments in which various mixtures of CaCO_3 , $\text{Ca}_3(\text{PO}_4)_2$, AlPO_4 , and C (coke) were heated at 1450–1550° in reducing or oxidising atm. showed that the hydraulic $5\text{CaO} \cdot 3\text{Al}_2\text{O}_3$ can be prepared from $\text{Ca}_3(\text{PO}_4)_2$, AlPO_4 , and C heated under reducing conditions, and that P is obtained as a by-product. A. L. R.

Action of salt solutions on the setting and hardening of Portland cements and Portland cement mortars. R. GRÜN and H. MANECKE (Tonind. Ztg., 1934, 21, 264–266, 276–278).—Equal mol. concns. of MgCl_2 , CaCl_2 , FeCl_3 , and AlCl_3 accelerate the setting time of commercial Portland cements, increasing in effectiveness in the order given. Higher concns. of the individual salts also hasten the setting process. The activity of mixes of two salts lies between those of the individuals. MgSO_4 up to 1.0M causes retardation, but from 1.0M to 2.0M setting is accelerated. $\text{Al}_2(\text{SO}_4)_3$ shortens the setting time considerably. The compression strength of concretes mixed with 1.0M solutions of the chlorides is < those with H_2O , but this is reversed with 0.5M and 0.25M solutions. CaCl_2 causes a good increase in strength in $\frac{1}{2}$ –1 day. MgSO_4 and $\text{Al}_2(\text{SO}_4)_3$ are destructive. T. W. P.

Heat of hydration of Portland cement pastes. W. LERCH and R. H. BOGUE (Bur. Stand. J. Res., 1934, 12, 645–664).—The partial and total heats of hydration have been measured directly and also from the heats of dissolution in the same solvent of the hydrated and unhydrated samples. The total heats available on complete hydration of $3\text{CaO} \cdot \text{SiO}_2$, $2\text{CaO} \cdot \text{SiO}_2$, $3\text{CaO} \cdot \text{Al}_2\text{O}_3$, and $4\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot \text{Fe}_2\text{O}_3$ were 120, 62, 207, and 100 g.-cal./g., respectively. The heat of reaction of CaSO_4 and $3\text{CaO} \cdot \text{Al}_2\text{O}_3$ is 149 g.-cal./g. of SO_3 . From these heat vals. the total heat available on complete hydration of a clinker or cement may be calc. from its composition, observed and calc. vals. agreeing. A relatively large proportion of the total heat available is liberated in a few days. The rate of heat evolution increases as the surface of the cement is increased by grinding. H. J. E.

Properties of mortars and bricks and their relation to bond. L. A. PALMER and D. A. PARSONS (Bur. Stand. J. Res., 1934, 12, 609–644).—Physical data for mortars and bricks are recorded. The extent of bond is determined chiefly by the H_2O -retaining capacities of the mortars and the absorption rates of the bricks. The effects of brick and mortar properties on strength of bond in tension, bond durability, transverse strength of brick beams, and compressive strength of brick piers are discussed. H. J. E.

Inflammability of painted wood. III. C. A. L. DE BRUYN (Verfkroniek, 1934, 7, 165–171).—Extensive tests indicate that there is little difference between the inflammability of wood painted with oil paints and that of wood painted with pigmented cellulose nitrate or acetate lacquers. Na_2SiO_3 primers afford the best protection against fire; they may be given a top coat of oil paint or a chlorinated rubber finish. The latter alone does not afford satisfactory protection to wood. D. R. D.

Chemical utilisation of waste wood. K. E. NEUMANN (Papier-Fabr., 1934, 32, 321–326).—A brief review of the production of building materials, sugar, and fodder, and of carbonisation etc.

Determination of mercury in kyanised timber. F. SCURTI and G. DROGOUL (L'Ind. Chimica, 1934, 9, 448–461).—The wood (20 g., in small pieces) is mixed with 10 g. of sand and heated under reflux for 2 hr. with 125–150 c.c. of 10% HCl. The liquid is then filtered off, and the wood ground as finely as possible in a mortar with more sand and extracted for a further 2 hr. with 10% HCl. The Hg in the combined filtrate is pptd. and weighed as HgS , any org. matter in the ppt. being removed by washing with 30% NaOH. Tests made on kyanised timber 10 days and 8 months after treatment showed that 98.6–99.6% of the Hg is recovered. The process of kyanising is discussed in some detail, and with particular reference to the extent of penetration of the HgCl_2 into fir, pine, and larch. H. F. G.

Testing refractory mortars.—See VIII. **Effect of building materials on paint.**—See XIII.

See also A., July, 720, $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$. 741, Reaction between CaO and SiO_2 .

PATENTS.

Apparatus for simultaneously cooling cement clinker and extracting moisture from slurry. L. E. PALMER, Assr. to WABASH PORTLAND CEMENT Co. (U.S.P. 1,937,094, 28.11.33. Appl., 15.6.31).—An inclined drum for cooling clinker is provided with hollow, external, annular fins (F) which dip into baths of slurry. Any dry slurry that sticks is scraped off at one point of the revolution, and ports are provided to permit the clinker to pass through the main shell into F and back again. B. M. V.

Production of [cementitious] foam. R. ERICSON, Assr. to UNITED STATES GYPSUM Co. (U.S.P. 1,937,472, 28.11.33. Appl., 25.11.29).—A 3–4% starch solution is made in the usual way (small quantity of cold H_2O first), soap bark (0.75%) is added while hot, the solution aerated to foam, allowed to cool, and used with or as the H_2O for hydraulic cement, to form porous building blocks. B. M. V.

Impregnation of concrete bodies and porous ceramic products with bituminous material. E. C. WALLACE, Assr. to WARREN BROS. Co. (U.S.P. 1,937,417, 28.11.33. Appl., 20.8.30).—The dried, porous article is immersed in a hot oil (A) which is miscible with asphalt (B), and, after draining, in hot unthinned B at a temp. at which A will volatilise. A preliminary application of vac. is desirable. B. M. V.

Manufacture of gypsum plaster. G. F. MOORE (U.S.P. 1,937,292, 28.11.33. Appl., 19.8.32).—A "brown coat" foundation plaster is manufactured from the CaSO_4 by-product of H_3PO_4 manufacture, by calcination to the first settle (166–177°) and mixing with $\text{Al}_2(\text{SO}_4)_3$, clay, and a retarder. B. M. V.

Treatment of refuse and manufacture of building material therefrom. M. M. UPSON (U.S.P. 1,936,810, 28.11.33. Appl., 19.8.30).—Refuse is separated into: (1) coarse ash, (2) fine ash, and (3) bulky materials. The heat of (1) is used to incinerate (3), and the ashes are remixed with (2) and sintered. B. M. V.

Manufacture of artificial stone product. H. OBERHERR, Assr. to AMER. ARTIFICIAL MARBLE CO. (U.S.P. 1,935,985, 21.11.33. Appl., 2.5.31).—An artificial stone of chalk and Portland cement is polished with $\text{H}_2\text{C}_2\text{O}_4$ alone or together with water-glass and/or a fluoride. B. M. V.

Dental filler. W. SALZMANN and R. FUNKE (U.S.P. 1,935,418, 14.11.33. Appl., 31.3.31. Ger., 2.7.30).—Powdered diamond or SiC is embedded in a known silicate or phosphate cement. B. M. V.

Manufacture of cellular composition. H. M. SPENCER, Assr. to UPSON CO. (U.S.P. 1,936,887, 28.11.33. Appl., 13.6.31).—Sulphite liquor is conc. just short of dryness (or previously obtained "pitch" is redissolved) and mixed with finely-divided inorg. filler, the mixture being heated to 177° to cause intumescence, preferably while confined in a mould. B. M. V.

Manufacture of paving composition. D. B. ANDREWS and H. B. HURD (U.S.P. 1,934,689, 14.11.33. Appl., 27.2.31).—A composition for tennis courts etc. comprises a major part of clay tempered and baked with a small quantity (1½%) of $\text{Ca}(\text{OH})_2$, to which is added, while hot, anthracite screenings (10%) and ZnO (1%). B. M. V.

Materials for road construction. J. R. GEIGY A.-G. (B.P. 411,640, 7.4.33. Ger., 16.4.32).—Chlorinated rubber which is readily sol. in tars and tar preps. by a process of chlorination is incorporated with the bituminous road materials either before or during the construction of the road, the quantity added (> 20%) depending on the class of road. Lower-grade binding agents afford useful materials for roads by its addition. H. C. M.

[Flexible] bitumen sheeting. RUBEROID CO., LTD., and D. L. IRWIN (B.P. 411,672, 19.5.33).—The exposed faces of the material are constituted by appreciably thick layers of bituminous composition (I) between which are one or more layers of asbestos felt or fabric (II) impregnated with bitumen. A proportion of inorg. fibrous material is preferably incorporated with (I), which consists mainly of oxidised petroleum asphalt (m.p. 185°, Krämer-Sarnow method). The proportion by wt. or vol. of (I) considerably exceeds that of (II). H. C. M.

Manufacture of grained wood[-block]. C. J. FESS (U.S.P. 1,934,414, 7.11.33. Appl., 4.3.31).—A graining plate for printing a grained pattern is manufactured by treating a planed slab of wood with conc. aq. borax at the b.p. and sandblasting the surface while

still wet, then rinsing, drying, slightly smoothing, and finally applying a pyroxylin lacquer. B. M. V.

Applying the gum hydrocarbons [to toughening wood]. F. F. VON WILMOWSKY (U.S.P. 1,933,573, 7.11.33. Appl., 11.3.29. Renewed 22.4.33).—Wood or other fibrous material is freed from resinous, fatty, oily, and starchy substances and is then impregnated with a solution of a tenacious hydrocarbon gum in a neutral, volatile hydrocarbon solvent containing also a mild vulcanising agent, e.g., S. The solvent is volatilised at a temp. below the softening point of the gum, but the temp. of the wood is finally raised above that point to cause coalescence. B. M. V.

Manufacture of [roof] tiles. (BARON) C. WALDBOTT and J. GROSSMAN (B.P. 411,648, 13.4.33).

Cellular clay body.—See VIII.

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

Use of burnt lime as flux in the [iron] blast furnace. E. BAUMGARTNER (Stahl u. Eisen, 1934, 54, 509–512).—The use of CaO instead of CaCO_3 as a flux in the Fe blast furnace (I) results in a decreased consumption of 15–16% of coke per ton of pig Fe and a smoother running of (I), whereby the Fe production for the same vol. and temp. of blast is increased by about 19%. The composition and temp. of the flue gases remain practically unchanged, but the dust content is very much < with CaO as flux. The higher temp. of the Fe tapped from (I) ensures a more regular uniform composition and structure of the pig Fe. A. R. P.

Production of dynamo and transformer [iron] sheets. W. EILENDER and W. OERTEL (Stahl u. Eisen, 1934, 54, 409–414).—A review of recent work on the production of Si-steel sheet with a low watt loss. A. R. P.

Town gas in the steel industry. H. A. FELS (Gas J., 1934, 206, 587–603).—The principles of, and application of town gas to, billet heating, sheet heating, annealing, and heat-treatment for hardening are described. The effect of furnace atm. on the scaling and decarburisation of steel is summarised with special reference to town gas. Furnace atm. can be controlled by cooling the products of theoretical combustion, to remove most of the H_2O , and adding unburned gas. Control thus possible with town gas is considered in relation to bright annealing, bright hardening of C steels, and hardening of high-speed steels. T. H. B.

Steel alloys for [oil]-cracking apparatus. H. J. SCHIEFLER (Petroleum, 1934, 30, No. 21, 1–7).—The development of special steels immune from intercryst. failure, carbonisation, and H_2 -sickness at high temp., and suitable for the manufacture of oil-cracking tubes, is briefly discussed. The best results are obtained with low-C Cr steels containing Mo, Ti, or V, or combinations of these, to prevent changes in the C distribution at high temp.; addition of Al improves the resistance to scaling and prevents catalytic action of the steel on the hot oil vapour and consequent deposition of soot in the tubes. In modern cracking apparatus, double tubes are frequently employed; various examples are described and their utility is discussed. A. R. P.

Determination of phosphorus in cast iron and steel by means of 8-hydroxyquinoline. S. S. SHUKOVSKAJA and S. S. BERNSTEIN (Zavod. Lab., 1934, 3, 214—216).—2 g. of metal, containing > 5 mg. of P, are dissolved in 20 c.c. of 50% HNO_3 , the solution is evaporated to dryness, the residue is ignited to complete decomp. of nitrates, when it is dissolved in 35 c.c. of conc. HCl , and the solution is diluted to 160 c.c.; 20 c.c. of 10% $(\text{NH}_4)_2\text{MoO}_4$ and 20 c.c. of 0.6% 8-hydroxyquinoline are then added at room temp., the solution is heated at 100° for 30 min., cooled, and filtered. The ppt. is washed with a solution of 3 c.c. of conc. HCl and 3 g. of NaCl in 100 c.c. of H_2O , and dissolved in a mixture of 10 c.c. of conc. HCl and 40 c.c. of 48% EtOH , 50 c.c. of H_2O and a few drops of 1% indigo-carmin are added, and 0.1N- KBrO_3 - KBr (I) is added until the colour changes from blue to yellow, when 5 c.c. of 10% KI are added, and the liberated I is titrated with 0.1N- $\text{Na}_2\text{S}_2\text{O}_3$ (II). The % P content is given by $0.00013(a-b)$, where a represents the no. of c.c. of (I) taken, and b that of (II). The method requires 2.5—3.5 hr., and is applicable in presence of SiO_2 and As. R. T.

Determination of arsenic in cast iron and steel. C. J. RABINOVITSCH (Zavod. Lab., 1934, 3, 211—214).—5 g. of metal are dissolved in 70—80 c.c. of aqua regia, with cooling, excess of acids is removed by evaporation, the residue is dissolved in 30 c.c. of 66% HCl , the solution is filtered, 40 g. of $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$ in 70 c.c. of conc. HCl are added, and the mixture is heated under reflux at 70° for 30 min. The pptd. As is collected, washed, and dissolved in standard I in KI solution, excess of which is determined by $\text{Na}_2\text{S}_2\text{O}_3$ titration. R. T.

Determination of vanadium in steel. R. TAGER (Zavod. Lab., 1934, 3, 369).—1 g. of steel is dissolved in 50 c.c. of H_3PO_4 , 15 c.c. of 50% HNO_3 and 5 c.c. of conc. H_2SO_4 are added, and the solution is evaporated to appearance of fumes of SO_3 , when the residue is diluted to 200 c.c. Then 2—3 c.c. of 3% KMnO_4 are added to oxidise V to V^{V} , excess of KMnO_4 is removed by 1% $\text{H}_2\text{C}_2\text{O}_4$, 0.5 g. of KI is added, and liberated I titrated with standard $\text{Na}_2\text{S}_2\text{O}_3$. R. T.

Determination of tungsten and molybdenum in ferro-alloys containing both. N. J. CHLOPIN (Zavod. Lab., 1934, 3, 297—301).—0.6 g. of powdered alloy is fused with 3 g. of Ditmar's mixture, the melt is boiled for 5 min. with 100 c.c. of 25% aq. NH_3 , the filtrate (I) from the $\text{Fe}(\text{OH})_3$ so pptd. is heated to boiling, 100 c.c. of Mdivani's reagent [50 g. of $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$ in 200 c.c. of conc. HCl (II)] and 20 c.c. of (II) are added, the suspension is conc. to a syrup, diluted to 200 c.c., and the ppt. of W_2O_5 is allowed to settle, washed, ignited, and weighed as WO_3 . Mo is determined in a fresh portion of alloy, which is initially treated as above, (I) is diluted to 300 c.c., 20 c.c. of 20% tartaric acid are added to 100 c.c. of the solution, which is then made acid with H_2SO_4 and neutral with aq. NH_3 , 15 c.c. of 33% H_2SO_4 are added, and H_2S is passed for 2 min., the tightly stoppered flask is heated at 100° for 1 hr., and the ppt. of MoS_3 is collected, ignited, and weighed as MoO_3 . R. T.

Effects of inhibitors on solubility of iron and steel in acid. K. TERANO and T. TAKASAKI (J. Soc.

Chem. Ind., Japan, 1934, 34, 175 B).—Some thiocarbamates, dithiocarbamates, and compounds with a thiazole group markedly inhibited the solubility of steel in 3N- H_2SO_4 , possibly due to the formation of a surface film of inhibitor. Embrittlement caused by pickling is greatly reduced. R. S. B.

Pickling-blisters on zinc and steel sheets. O. VOGEL (Stahl u. Eisen, 1934, 54, 446—449).—The development of blisters on Zn and steel sheets after pickling in dil. acid containing no inhibitor is attributed to attachment of H_2 bubbles on the underside of inclined surfaces and on grease spots. Examples are described and discussed. A. R. P.

Reduction tests on [iron] ore cubes in hydrogen. W. BAUKLOH and K. FROESCHMANN (Stahl u. Eisen, 1934, 54, 415—416).—The course of the reduction in H_2 of cubes (12-mm. edge) of hæmatite at 750 — 950° has been investigated. The rate of reduction increases with rise in temp. to 870° , then decreases sharply to a min. at 920° owing to the low permeability of Fe to H_2 at the α - γ transformation point. A. R. P.

Studies of the wire-drawing process. IV. Angle and contour of the die. E. L. FRANCIS and F. C. THOMPSON (Iron Steel Inst., Carnegie Schol. Mem., 1933, 22, 1—13). V. Experiments with a rotating die. E. L. FRANCIS, H. GREENWOOD, and F. C. THOMPSON (*Ibid.*, 15—30). VIa. Experiments bearing on the "casting" of wire. A. S. KENNEFORD and F. C. THOMPSON (*Ibid.*, 31—49).—IV. With straight, tapered WC dies an angle of 6° gives the best results in drawing steel wire.

V. With a rotating die the tension in a steel wire can be reduced considerably $<$ that required with a stationary die, but the strength of the resulting wire is less, the ductility greater, and the recrystallisation temp. unchanged.

VIa. The mechanical causes of "casting" of wire have been investigated and some suggestions for its prevention are discussed. A. R. P.

Metallurgy of the fusion welding of iron with special reference to nickel alloy welding material. W. KLEINEFENN (Iron Steel Inst., Carnegie Schol. Mem., 1933, 22, 97—133).—Absorption of N and O by the weld metal (W) is with bare electrodes $>$ with flux-coated electrodes; N absorption (I) is with a.c. much $>$ with d.c., whereas O absorption is only slightly higher. The use of a Ni alloy welding rod reduces (I) considerably and also prevents ageing of W especially when a coated rod is used. Normalising of the lower weld beads by the successive ones reduces the notched impact val. when the O content is $>$ the solubility of O in α -Fe. The Ehn cementation test does not afford a clear idea of the val. of a fusion weld. A. R. P.

Development of slip lines and fatigue cracks under repeated stresses in low- and high-carbon steels welded by the butt-welding method (flash weld). T. VÉR (Iron Steel Inst., Carnegie Schol. Mem., 1933, 22, 135—156).—The tensile strength of welds in steel with 0.05—0.86% C is $>$ that of the unwelded metal, but the hardness is the same or lower, although an area of high hardness occurs just outside the soft

welded section due to rapid cooling of the metal at these points. The endurance limit (E) of welds depends on the development of a ferrite network (F) in them; in low-C steels the Widmanstätten structure produced by welding seems to retard the development of slip lines, whereas in high-C steels the fatigue crack starts and spreads in the previously formed slip lines in the F in the direction of max. shear stress. E is low when F is wide, but when F is thin and in unconnected layers E is considerably increased. Hence E is raised by keeping the welding time to a min. and by using alloy rods containing an element sol. in F .

A. R. P.

Refining nickel alloy steels in acid open-hearth furnaces. T. FUJIWARA (Japan Nickel Rev., 1934, 2, 135—164).—The mechanism of the decarburisation and deoxidation of steel in acid open-hearth furnaces is illustrated by analyses of the steel and slag at various stages of the process and by the appearance of dip samples of the metal. The theory of the reactions is discussed.

A. R. P.

Comparison of the mechanical properties of nickel alloy steels and carbon steels. W. KUROSE (Japan Nickel Rev., 1934, 2, 203—215).—The mechanical properties of 20 plain C, Ni, and Ni-Cr steels have been determined and the results are shown in tables and graphs. The elongation of Ni steels is twice, and the Charpy impact val. 10 times, the corresponding vals. for plain C steels having the same tensile strength and C content.

A. R. P.

Study of permanently magnetic [iron] alloys in Japan. K. HONDA (Japan Nickel Rev., 1934, 2, 128—134).—An alloy of Fe with 30% Ni and 12% Al has a coercive force (F) of 200—700 and a magnetic induction (I) of 11,000—7500 and its magnetism is stable to heat and vibration; the alloy cannot be forged, but must be cast into shape and ground to the desired finish. An alloy of Fe with Ni 10—25 and Ti 8—25% after quenching from a semi-molten state and annealing at 660° has F 780—920 and I 7600—6300; both of these properties can be improved by magnetising in a strong field. The magnetic properties of these two alloys are compared with those of Co steels and other magnetic alloys.

A. R. P.

Temper-brittleness of steels. K. NAGASAWA (Japan Nickel Rev., 1934, 2, 165—202).—Temper-brittleness (B) occurs in Cr, Mn, Si, and Ni steels, but not in plain C, W, Mo, and V steels; two types of B are distinguishable, (I) occurring within the range 450—525° and being independent of the rate of cooling after tempering and (II) occurring at > 525° and being produced by differences in the cooling rate after tempering. (I) is due to the pptn. of carbide (C) from α -Fe and (II) to the increase of solubility of C in α -Fe at > 525° and to the difference of the amount of pptd. (I) in the rapidly and the slowly cooled metal. C is usually Fe_3C or a solid solution of Fe_3C with the alloying element. Tempered articles of susceptible steel should not be heated at < the tempering temp. otherwise B develops and tempering must be repeated. Ni increases the solubility of Fe_3C in α -Fe at > 525° and thus renders steels more susceptible to B ; addition of W reduces B .

A. R. P.

Proposed diagrams for carbon steels. J. SEIGLE (Chim. et Ind., 1934, 31, 773—785).—Theoretical. Methods of representing the γ - α transformation, changes in the solubility of Fe_3C , and magnetic changes in C and alloys steels are discussed.

A. R. P.

Nitrogen-hardening of steels. II. Nitriding properties of some chromium and austenitic steels at 500°. B. JONES (Iron Steel Inst., Carnegie Schol. Mem., 1933, 22, 51—96; cf. B., 1933, 151).—Austenitic steels containing 10—23% Mn can be given a surface-hardness (H) of 700—1000 Vickers Brinell by nitrogenisation in NH_3 at 500—510°; at the same time the core-hardness is raised by the γ - α transformation which occurs simultaneously. Ni steels cannot be case-hardened by N owing to the absence of elements which form a finely-dispersed and insol. nitride. Ni-Cr and Cr-Ni-W steels behave irregularly on heating in NH_3 owing to presence of a passive film which prevents penetration of N. If this film is removed by pickling in HCl or by Cu-plating, nitrogenisation produces an H of > 1000 to a depth of 0.008 in. With > 18% Cr and 8% Ni the austenite (A) is more stable and the resulting H lower. Non-magnetic steels become slightly magnetic after nitrogenisation since the γ -phase in the surface layers is converted into α by absorption of N; this produces a decrease in the resistance to corrosion of the surface layers. The decomp. of A is greatest in Mn steel and 18:8 Cr-Ni-steel and the greatest depth-hardening occurs in these steels due to the formation of finely-dispersed, insol. particles of complex Cr or Mn nitrides in the α -Fe, which produce distortion of the lattice and consequent interference to cryst. slip.

A. R. P.

Rapid determination of zinc in ores. B. KAMIENSKI and M. MYRONOWICZ (Rocz. Chem., 1934, 14, 268—274).—1 g. of blende is dissolved in aqua regia, 0.75 c.c. of conc. H_2SO_4 added, and the solution evaporated to evolution of SO_3 , when insol. sulphates separate. Aq. $(NH_4)_2CO_3$ is added to the filtrate, followed by 3.8 g. of NH_4OAc and 300 c.c. of H_2O at 100°. 25 c.c. of N -AcOH are added to the cooled solution, which is then electro-titrated with standard aq. $K_4Fe(CN)_6$. Fe: Zn in the ore should be > 3:2.

R. T.

Refining of scrap nickel. H. HERMANN (Chem.-Ztg., 1934, 58, 481—482).—The scrap is melted in a basic-lined, oil-fired reverberatory or in a clay-lined graphite crucible and heated at 1550° in an oxidising atm. until the S, As, and Zn are volatilised and the Fe and Si slagged off; deoxidation is effected with Mg alone or, preferably, with 0.2% of Mn followed by 0.1% of Mg. Pb is difficult to oxidise unless < twice as much Zn is present; Si also aids the oxidation of Pb, but its addition adversely affects the mechanical properties of the Ni.

A. R. P.

Potentiometric separation of chromium and tungsten, and their determination in steel. H. BRINTZINGER and E. JAHN (Angew. Chem., 1934, 47, 456—457).—In neutral solution at 85° Na_2CrO_4 and Na_2WO_4 can be titrated successively with $BaCl_2$, using first a Cr-plated steel wire as indicator electrode and secondly a W wire, all the $BaCrO_4$ being pptd. before the $BaWO_4$. The method can be applied to the

determination of Cr and W in steel after separation of the Fe, Mn, etc. by treating the acid solution with aq. NH_3 and H_2O_2 . Excess of the precipitants is removed from the filtrate by boiling, a few c.c. of EtOH are added, and the titration is made at 85° with 0.1N-BaCl₂.

A. R. P.

Special alpac [alloys]. P. BARRAUD (Rev. Aluminium, 1934, 2421–2423).—The strength (S), hardness (H_B), and elongation (E) of alpax are improved by addition of 0.3% of Mg and 0.3–0.5% of Mn, especially if the castings are annealed for 4 hr. at 500° , quenched, and tempered at 150° for 24 hr. After this treatment the 0.3:0.5 Mg-Mn alloy has S 26 kg./sq. mm., E 2%, and H_B 98, compared with 17.5, 4, and 61, respectively, in the cast state.

A. R. P.

Effects of alloying on electrical resistance of aldre-type alloys. S. KISHINO (J. Soc. Chem. Ind., Japan, 1934, 34, 175–176 B).—Alloys were made (a) by adding Si and Mg separately to molten Al, and (b) by adding them as the compound Mg_2Si . The sp. resistance of alloys (a) and its increase on quenching at 510° are > for alloys (b). The rate of increase varies linearly with the $[\text{Mg}_2\text{Si}]$. No change in resistance due to quenching occurs with < 0.475% Mg_2Si , whence it is concluded that 0.475% is the max. limit of solubility of Mg_2Si at room temp. After annealing, all samples have nearly the same resistance.

R. S. B.

Temper-hardening of alloys. VIII. [Photo-]micrographic studies on the tempering of copper-aluminium light alloys. D. UNO and Y. MURAKAMI (J. Soc. Chem. Ind., Japan, 1934, 34, 176–177 B).—Photomicrographs of Cu-Al alloys containing 4% Cu show that the degree of hardening depends on the extent to which the crystallites of CuAl_2 are dispersed uniformly throughout the solid.

R. S. B.

Adherence of electrolytic deposits of copper. P. JACQUET (Compt. rend., 1934, 198, 1909–1911; cf. B., 1934, 583).—The adherence (I) of Cu deposited on nickelised steel was influenced by polishing etc. of the support, and by the mechanical tension (II) (cf. Marie and Thon, B., 1932, 554) during deposition, (II) being governed by the concn. and acidity of the electrolyte. (I) was less at high vals. of (II). Strong deposits left a film of Cu on the support after stripping. Weak deposits from slightly acid solutions contained inclusions of Cu_2O .

B. W. B.

Non-poisonous baths for electroplating. H. GÖCKEL (Z. Elektrochem., 1934, 40, 302–303).—Hard and uniform deposits of Ag capable of a fine polish can be obtained by dissolving 25–30 g. of AgNO_3 and 60–70 g. of $\text{CS}(\text{NH}_2)_2$ in 1 litre of H_2O , and electrolysing at 30 – 35° and c.d. 0.2 amp. per sq. dm. Cu and Au may be deposited in a similar manner.

F. L. U.

Cu in textile[-dyeing plant].—See VI.

See also A., July, 724, Diffusion in metals. Superconductivity of alloys. Systems Sb-Pb, Ti-Pb, Li-Bi, Fe-Sn, Ni-Cr, and Pt-Cr. 725, Transition of β -brass. Thorium- β in some metals. Equilibrium in ternary alloys. Alloys of Mg with Al and Cu. Fe-Ni-V alloys. Alloys of Ag and Cu with elements of the B sub-groups. 735, Deposition

of Po. Electrochemical properties of Ge, and of the Fe-Sn couple. 738, In-plating. 739, Prep. of CaSi_2 . 742, Prep. of pure As. 747, Spark spectrum of a Se-Cr-Ni steel. Spectral determination of Sn in Cu. 748, Detection and determination of small contents of Pt metals. 749, Applications of dielectric measurements. Metallised glass quinhydrone electrodes.

PATENTS.

Recirculating furnace [for annealing etc.]. C. B. THORNE (U.S.P. 1,937,395, 28.11.33. Appl., 22.4.31).—To prevent stratification in a heating chamber (A), part of the gases from a main combustion chamber is passed through A and part recirculated from the outlet flue back to A by means of the impulsive effect of gases from an auxiliary combustion chamber acting in a Venturi throat.

B. M. V.

[Carburising] furnace. F. J. PETERSON (U.S.P. 1,934,614, 7.11.33. Appl., 30.11.31).—The furnace comprises a pressure-retaining retort in which an atm. of carburising gas is formed by the decomp. of a suitable material not in contact with the goods, a pressure being self-generated.

B. M. V.

Hardening of metal parts. J. SCHULEIN (U.S.P. 1,934,741, 14.11.33. Appl., 23.1.32).—High-speed steel, locally electroplated with Ni, Co, or preferably Cr, remains soft and tough under the plate when the whole mass is heated above the crit. point and quenched.

B. M. V.

Flash-roasting unit. E. C. CLARKE, Assr. to BETHLEHEM FOUNDRY & MACHINE Co. (U.S.P. 1,929,308, 3.10.33. Appl., 2.7.32).—A furnace for drying and flash-roasting of flotation concentrates (C) comprises a vertical cylindrical roasting chamber (I) with a perforated roof (II) spaced some distance below the floor of the drying chamber (III), a wide pipe leading from the space between (II) and (III) through a drying grid spaced above the floor of (III), and thence to a dust collector. The C are automatically fed into the centre of (III) and are caused to travel by rotating rabblers towards the periphery, from which they are blown through a series of jets into the top of (I) by means of preheated air. Automatic rakes at the bottom of (I) continuously discharge the hot, roasted C, and the SO_2 is partly cooled before passing to the acid plant.

A. R. P.

Apparatus for treating slag. T. BARTHOLOMEW (U.S.P. 1,937,187, 28.11.33. Appl., 27.2.30. Norw., 27.2.29).—Molten slag is solidified in cellular form by agitation with H_2O in an inclined vessel constructed with double metallic walls having heat insulation between.

B. M. V.

(A) Apparatus, (B) process, for treating metals. [Zincification of lead.] J. O. BETTERTON and Y. E. LEBEDEF, Assrs. to AMER. SMELTING & REFINING Co. (U.S.P. 1,934,479–80, 7.11.33. Appl., [A] 11.11.31, [B] 7.4.33).—Pb is lifted by a pump from a kettle and passed through reaction chambers in presence of gases to form ZnO and ZnCl_2 , respectively. Borax and/or NaCl may be used as fluxes and the oxychloride slag is skimmed off at the main bath and applied to a fresh batch of Pb, the slag then becoming saleable and the

Pb partly freed from Zn. 425–450° is a suitable temp., and the content of Zn is reduced to 0.15–0.10%.

B. M. V.

Crushing ores etc. Centrifugal separator [for alluvial Au]. Pyrometer tube.—See I. Fibrous-coated filaments.—See V. Phosphate from Fe-P. S from roaster gases.—See VII. Pb. glazes.—See VIII.

XI.—ELECTROTECHNICS.

Dry cell for use at low temperatures. N. KAMEYAMA (J. Soc. Chem. Ind., Japan, 1934, 37, 168 B).—An ordinary dry cell cannot be used below –20°, mainly because of freezing of the electrolyte (eutectic temp. about –16°). A cell containing 29.9% of CaCl₂ can be used at –50°.

R. S. B.

Simple electrodialyser and its use in textile and tannery processes [etc.]. E. ELÖD and W. SEGMUND (Collegium, 1934, 277–281).—A dialyser is described in which a current of electricity passed between Pt or Cr electrodes is used to free chrome leather, wool, silk, or acetylcellulose from electrolytes.

D. W.

Detarring coke-oven gas.—See II. **Photometer for textiles.** Optical properties of paper.—See V. **Pure MnO₂.**—See VII. **Transformer Fe.** **Welding material.** **Magnetic alloys.** **Determining Zn in ores, and Cr and W in steel.** **Resistance of alloy alloys.** **Adherence of Cu deposits.** **Plating baths.**—See X. **Sugar-boiling control.**—See XVII.

See also A., July, 725, **Ferromagnetic Fe-Ni-V alloys.** 735, **Deposition of Po.** **Electrochemical behaviour of Ge, and of the Sn-Fe couple.** 738, **In-plating.** 739, **Prep. of CaSi₂.** **Electrolytic oxidation of β-hydroxypropionic acid.** 748, **Colorimetry.** 749, **Applications of dielectric measurements.** **Metallised glass quinhydrone electrodes.**

PATENTS.

Electric furnace. R. GRÄNZER, Assr. to A.-G. BROWN, BOVERI & Co. (U.S.P. 1,933,851, 7.11.33. Appl., 10.3.32. Ger., 13.3.31).—The heaters are arranged in several stories around a crucible (C); a sinker in C, resting on the solid metal at the start, switches them on in order downwards, so as to melt the metal from the top first.

B. M. V.

Induction electric furnace. E. F. NORTHRUP, Assr. to AJAX ELECTROTHERMIC CORP. (U.S.P. 1,936,309, 21.11.33. Appl., 4.11.31).—Each turn of the coil is strictly planar (not helical) for nearly 360° and is connected to its neighbours by short links welded on.

B. M. V.

Electrical precipitation [for gases]. R. HEINRICH, Assr. to INTERNAT. PRECIPITATION CO. (U.S.P. 1,934,923, 14.11.33. Appl., 29.8.32. Ger., 3.8.29).—In an electrostatic precipitator the live electrodes are excited during one half-wave and earthed through a resistance during the other, the power of which may be used in another (section of the) precipitator.

B. M. V.

Electrical treatment of gases or liquids [e.g., for precipitating suspended particles]. LODGE-COTTRELL, LTD. From SIEMENS-LURGI-COTTRELL-ELEKTROFILTER-GES.M.B.H. F. FORSCHUNG U. PATENT-

VERWERTUNG (B.P. 411,722, 19.9.33).—Means are provided for subjecting the gas or liquid successively to d.c., a.c., or impulse ionisation current for times which are independent of the periodicities of the supply currents.

J. S. G. T.

Improving the insulation of electrical conductors. R. F. MCKAY. From INTERNAT. LATEX PROCESSES, LTD. (B.P. 411,685 and 411,695, [A] 20.6.33, [B] 7.7.33).—(A) The use of rubber latex which has previously been deprived of at least part of its H₂O-sol. ingredients by centrifuging or creaming, for the treatment of electrical conductors leads to improved insulation. (B) In fibre-covered electrical conductors, particularly those with latex rubber deposited on the fibre, the insulation is improved by removing stray fibres, e.g., by treatment with H₂SO₄, NaOH, or ZnCl₂, or by singeing, before application of the rubber.

D. F. T.

Gas-cleaning tower. Hygrometer.—See I. **Aliphatic acids from alcohols.** **Reduction of NO₂-compounds.**—See III.

XII.—FATS; OILS; WAXES.

Alcoholysis of fats. IV. **Alcoholysis of olive oil and esterification of olive oil fatty acids by mixtures of two different alcohols.** Y. TOYAMA, T. TSUCHIYA and T. ISHIKAWA (J. Soc. Chem. Ind., Japan, 1934, 37, 192–193 B; cf. B., 1933, 753).—Alcoholysis is not selective with respect to the alcohols employed, since the sap. val. of the product obtained by the alcoholysis of olive oil (or the esterification of olive oil fatty acids) by equimol. binary mixtures of various alcohols (Me, Et, Pr, Buⁿ, Buⁱ, isoamyl) agrees closely with that calc. for equimol. mixtures of the corresponding esters.

E. L.

Removal of solid components from fatty oils and drying properties of the residual oils. I. **Soya-bean oil.** T. YAMADA (J. Soc. Chem. Ind., Japan, 1934, 37, 190–192 B).—The more saturated components of soya-bean oil were removed by repeated fractional crystallisation from COMe₂ at –20°; after 10 extractions the sol. portion had I val. 152.

E. L.

Constituents of waste fatty oil from soy manufacture. I, II. S. UCHIDA, K. SHIMOYAMA, T. T. HSŪ, and E. TOYODA (J. Soc. Chem. Ind., Japan, 1934, 37, 195–197 B).—The dark, mobile, odorous waste soy oil consists largely of Et esters of higher fatty acids. The orange oil obtained after refining with conc. H₂SO₄ and Japanese acid clay deposited a white ppt. (Et esters of saturated fatty acids) on keeping at 0°, and this had acid val. 32.3, sap. val. 193.2, unsaponifiable matter 1.4%, including a sterol, m.p. 137–137.5° (corr.) [acetate 127.3–128.3° (corr.); cf. Izume *et al.*, A., 1933, 1088]. Hydrolysis yielded glycerol 2 and EtOH 9% (on the oil). Palmitic, stearic, arachidic (very little), oleic, linoleic, and linolenic (small amount) acids were identified.

E. L.

Action of ultra-violet rays on vegetable oils. L. FRANCESCONI and L. PINONCELLI (Annali Chim. Appl., 1934, 24, 242–246).—Under the influence of ultra-violet light in CO₂ or N₂, vegetable oils undergo oxidation and tend to lose their colour; *n*_D increases,

especially with drying oils, the I val. falls, and the fluorescence in Wood's light becomes blue. Highly acid oils containing unsaturated acids darken. T. H. P.

Petroleum lubricating grease.—See II. Wool scouring. Oilskins.—See V. Paint problems.—See XIII.

See also A., July, 728, Capillary analysis [of fatty acids]. 753, Prep. of octyl alcohol and Me hexyl ketone from Chinese castor oil. 796, Pupa and Japanese chrysalis oils. Insect waxes. 812, Olive oil ozonide as fungicide. 816, Distillation of palm oil. 816—8, Vitamins (various).

PATENTS.

Degreasing by means of volatile solvents. W. E. BOOTH, J. SAVAGE, and IMPERIAL CHEM. INDUSTRIES LTD. (B.P. 411,468, 7.11.32).—A const. rate of degreasing is maintained by allowing the clean solvent draining from the condensing coils and the oily solution dripping from the goods to collect in separate sumps arranged so that, on heating, vapours from both reservoirs rise together through the goods. Apparatus is described. E. L.

Soap-sud dissolver.—See I. Esters of OH-acids. **Wax-like substances.**—See III.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Effect of building materials on paint films. H. M. LLEWELLYN (Dept. Sci. Ind. Res., Building Res., 1934, Bull. No. 11, 8 pp.; cf. B., 1931, 728).—Contrary to tradition, Keene's cement is best painted after it has had time to dry out thoroughly. Tung oil paints resist alkali better than those made with linseed oil. High- Al_2O_3 cements are safer with regard to painting, owing to their low K and Na contents. Plasters may be tested with a paint containing Prussian-blue and keeping the test-piece moist; the presence of alkali is shown by bleaching. Commercial petrifying liquids neutralise alkali, but do not eliminate the necessity for thorough drying. Fungi which attack paint may be harboured in porous building materials and can be prevented only by some form of poison or by sterilisation. G. H. C.

Phenolic resins in house paints. A. J. NORTON (Paint, Oil and Chem. Rev., 1934, 96, No. 12, 13—14).—Exposure trials on house paints demonstrate the marked superiority of media containing a phenolic resin in a tung oil-linseed oil mixture over straight linseed oil paints. D. R. D.

Livering of oil paints and enamels. SCHULMANN (Farbe u. Lack, 1934, 307).—The rates of livering (L) of a series of ZnO enamels made from tung oil varnishes which contained a small amount of linseed oil and either (a) Congo resin, (b) hardened rosin, (c) an oil-sol. $\text{PhOH-CH}_2\text{O}$ resin, or (d) an esterified resin, increased in the order (a), (b), (c), and, in the cases of (a) and (b), were proportional to the resin content and acid val. With (d) the consistencies increased rapidly to a const. Similarly prepared lithopone enamels livered at proportionately slower rates. The decrease in the η of both ZnO and lithopone enamels produced by adding various solvents, e.g., cellosolve, was not

proportional to L . Addition of tribasic acids, e.g., H_3BO_3 (cf. U.S.P. 1,836,264—5; B., 1932, 901), reduced the L of ZnO enamels containing (b) and (d), dibasic acids gave no definite results, whilst monobasic acids frequently increased L ; enamels containing (c) were, however, unaffected. These acids reduce the drying time and H_2O -resistance, but not the gloss or tendency to settle. S. M.

Testing of anti-rust paints by their resistance to sulphur dioxide. F. J. PETERS (Farben-Ztg., 1934, 39, 675—677).—The interval before rusting of painted Fe plates exposed under a bell-jar to air containing H_2O and SO_2 is determined principally by the time allowed for the film to dry before exposure. It increases sharply when a crit. drying time is exceeded. G. H. C.

Measuring the hardness of oil, paint, and varnish films. R. S. DANTUMA (Verfkronek, 1934, 7, 174—176).—A review of published methods. D. R. D.

Recent developments in paint, varnish, and lacquer technology. A. O. PLAMBECK (Chem. & Ind., 1934, 611—614).

The red lead or iron oxide problem. J. J. POST (Verfkronek, 1934, 7, 172—173).—The weather-resistance of various paints of stated composition containing Fe_2O_3 and/or Pb_3O_4 in a linseed oil medium has been compared. The following paint gave the best results: Pb_3O_4 40, Fe_2O_3 40, and stand oil 72 kg., thinned with turpentine. D. R. D.

Apparatus and plant for varnish manufacture. III. B. SCHEIFELE (Verfkronek, 1934, 7, 161—164; cf. B., 1934, 510).—A no. of filters and centrifuges for the clarification of varnishes are described. D. R. D.

Varnish fume control. ANON. (Paint, Oil and Chem. Rev., 1934, 96, No. 12, 16, 37).—A plant for the condensation of varnish fumes is described. D. R. D.

Natural resins in varnish-making. HILTON-DAVIS Co. (Paint, Oil and Chem. Rev., 1934, 96, No. 12, 33).—Exposure trials indicate that much of the credit given to synthetic resins is really due to the tung oil (I) with which they are used; natural resins made up in the same way with (I) give equally good results in many instances. D. R. D.

Application of polymerised organic acids in lacquers and plastic masses. H. SCHMIDT (Gummi-Ztg., 1934, 48, 659).—Colourless, light-stable polymerisation products of unsaturated org. acids (acrylic, crotonic, etc.) can be obtained in three degrees of hardness, viz., soft (I), medium-soft (II), and hard (III). (II) is still plastic at -15° , whilst (III) is plastic only at 40° . Solubilities are given for 34 solvents, and their stability under a variety of conditions (temp., reagents, etc.) is described. They are compatible with natural and synthetic resins, most cellulose derivatives, and plasticising agents. E. L. H.

Quick-drying non-nitrocellulose finishes. P. H. FAUCETT (Paint, Oil and Chem. Rev., 1934, 96, No. 12, 22—33).—A table is given in which the properties (colour, cost, rate of drying, etc.) of finishes containing copal, shellac, and various synthetic resins are classified

on a 1–10 scale according to their satisfactoriness. The results are discussed. D. R. D.

Making quick-drying high-solid lacquer with high-viscosity nitrocellulose. P. H. FAUCETT (Official Digest, 1934, No. 136, 139–149).—The relative merits of a large no. of lacquers of stated composition are discussed in detail. D. R. D.

Lithographic varnish viscosity determination. C. L. ORP (Amer. Ink Maker, 1934, 12, No. 6, 13–14).—Acid vals., d , η , and n are given for raw and boiled linseed oil and 11 lithographic varnishes. D. R. D.

Synthetic resins in varnish-making. R. A. WORSTALL (Paint, Oil and Chem. Rev., 1934, 96, No. 12, 20, 30).—Polemical. The use of natural resins is advocated. D. R. D.

Chemistry of synthetic varnish resins. I. ALLEN, JUN., V. E. MEHARG, and J. H. SCHMIDT (Ind. Eng. Chem., 1934, 26, 663–669).—The structures of ester gums and of phenolic, polyhydric–polybasic, vinyl, styrene, and amide–formaldehyde resins are reviewed. When a phenolic resin is autoclaved at 300° for several hr. with 10–15% aq. NaOH the product contains a higher proportion of higher-boiling phenols than did the material from which the resin was made; or phenols were formed which were not present in the original raw material. D. K. M.

Commercial utility of synthetic resins. J. M. SANDERSON (Paint, Oil and Chem. Rev., 1934, 96, No. 12, 11–30).—The properties and uses of ester gum and modified phenolic and alkyd resins are described. D. R. D.

Naphthenate driers. C. A. KNAUSS (Official Digest, 1934, No. 136, 158–160).—A general discussion of the theory and practice of the use of driers, the advantages of naphthenate driers being stressed. The retardation in the drying time of paints containing C black is attributed to the presence in the pigment of non-drying oil which slowly exudes from the pigment, and not to adsorption. D. R. D.

Pyrolysis of abietic acid. W. A. LA LANDE, JUN. (Ind. Eng. Chem., 1934, 26, 678–681).—*l*-Abietic acid was heated at 175–385° in a stream of N_2 for 1–15-hr. periods and CO , CO_2 , and H_2O evolved were determined; the residues also were examined. At < 275° the acid undergoes decarboxylation by loss of CO and CO_2 , whilst at 330–385° CO_2 and CO were produced also by the decomp. of the acid anhydride which began to form at 230°. Isomerism accompanied by a change of $[\alpha]$ was the only result of heating at 175° and at 230° for short periods. D. K. M.

Inflammability of painted wood.—See IX.

See also A., July, 730, Swelling capacity of cellulose acetate films.

PATENTS.

Varnish compositions [from synthetic resins]. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of R. E. COLEMAN (B.P. 411,744, 25.10.33. U.S., 27.10.32).—The soap formed by treating excess of a fatty oil with a base, e.g., CaO , is dissolved by addition of rosin, fatty acid, or other solvent, and the product, which may be

esterified with glycerol, is incorporated with an oil-sol. phenol–aldehyde or other compatible synthetic resin. S. M.

[Synthetic resin] varnishes. HOWROYD, MCARTHUR, & CO., LTD., and R. B. CROAD (B.P. 411,828, 13.9.32).—Resins obtained by condensing < 2 mols. of cresylic acid or other aromatic OH-compound with 1 mol. of CH_2O in a solution which is only slightly alkaline to Alizarin-red S are rendered oil-sol. by heating with linseed, castor, or tung oil. S. M.

Production of oil-soluble resins. W. J. TENNANT. From BAKELITE CORP. (B.P. 411,442, 5.12.32).—A cyclohexylphenol is heated with CH_2O or other compound containing CH_2 ; the products are compatible also with nitrocellulose. S. M.

Production of aldol condensation products. DISTILLERS CO., LTD., J. V. EYRE, and H. LANGWELL (B.P. 411,483, 6.12.32).—A resin of limited mol. complexity is obtained if the aq. aldol, during condensation, is maintained just alkaline to phenolphthalein. With acetaldo as starting material an approx. C_{12} compound is formed. S. M.

Esters of OH-acids.—See III. **Cellulose ester solvents.** [Plastic] compositions from esterified cellulose.—See V. **Abrasives.**—See VIII.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Effect of soya-bean lecithin on vulcanisation of rubber. Manufacture and uses of powdered rubber prepared with soya-bean lecithin. S. MINATOYA and N. KURAHASHI (J. Soc. Chem. Ind., Japan, 1934, 37, 207–208 B).—Soya-bean lecithin has the same effect as the lipin of *Hevea* latex on the vulcanisation of rubber. Soft rubber articles made from raw rubber powder prepared with the aid of this lecithin are inferior in physical properties to those manufactured from standard raw rubber, e.g., smoked sheet, but ebonite so prepared compares favourably with that from ordinary rubber except in electrical qualities. D. F. T.

Hardness measurements on rubber. VAN WIJK and M. C. SIEGMANN (Verfkroneik, 1934, 7, 176).—A review of published methods of measurement and the influence of vulcanisation, oxidation, and fillers on the hardness of rubber. D. R. D.

PATENTS.

Stabilised rubber latices. IMPERIAL CHEM. INDUSTRIES, LTD., H. M. BUNBURY, and R. B. F. F. CLARKE (B.P. 411,478, 5.12.32).—Latex is stabilised by adding an acid alkylsulphuric ester or its salt with an alkali metal, NH_4 , or an alkylammonium, in which the alkyl group is < C_{10} , e.g., cetyl, or derived from the alcohols in spermaceti. D. F. T.

Production of porous materials or bodies [comprising rubber]. NEW-YORK COMP. HAMBURGER GUMMI-WAAREN (B.P. 411,983, 25.2.33. Ger., 27.2.32).—Material suitable as a filter or diaphragm is produced by incorporating in unvulcanised ebonite a greater quantity of org. fibrous material such as linters. On vulcanisation the material becomes completely porous and pervious to liquids. D. F. T.

Production of [flat] rubber articles [from pairs of rubber sheets]. I. and L. DOROGI, and DOROGI ÉS TARSA GUMMIGYÁR R. T. (B.P. 411,961, 27.1.33. Hung., 1.12.32).

Mixing machine [for rubber etc.].—See I. Fibre-rubber mixings.—See V. Rubberised fabrics.—See VI. Electrical insulation.—See XI.

XV.—LEATHER; GLUE.

Determination of insoluble matter in vegetable tannin extracts. E. STIASNY (Collegium, 1934, 285—291).—100 c.c. of clear filtered solution have been obtained in < 1 hr., using the modified Riess method on cutch and untreated quebracho extracts, respectively, so that the criticisms of this method (cf. B., 1933, 980) are unfounded. D. W.

Quality of vegetable-tanned sole leather. II. R. M. MARRIOTT (J. Soc. Leather Trades Chem., 1934, 18, 307—329; cf. B., 1934, 372).—The average analytical vals. for 22 sole-leather (*L*) bends sampled from the official position and fore-end were, respectively (on the fat-free wt. at 75% R.H.): fat 2.3, 2.5; H₂O 14.3, 14.7; ash 1.4, 2.0; H₂O-sol. matter (*W*) 22.6, 30.8; hide substance 37.0, 32.3; fixed tan 23.9, 20.0. The average ratio of degree of tannage/*W* was > 1 in good *L* and < 0.65 in bad *L*. Variations in the chemical composition of the *L* from different parts of a bend necessitate a definite position for sampling. The total H₂O absorbed by good *L* is > 23% and the free H₂O is > 36%. The fibre structure of good *L* shows a high-angle weave pattern in which the fibres are full, closely woven together, and not much split up. The above chemical, physical, and microscopical tests are of most val. in assessing the qualities of different *L*. D. W.

Bacteriology of the [sweating of raw] skin. P. CHAMBARD (Chim. et Ind., 1934, 31, Spec. No., 979—981).—Raw skins are well washed, pelt is delimed and washed, and both are subsequently dehydrated with MeOAc, which is repeatedly renewed until after use it has *d* 0.770. The pelt is then dried in the air, degreased with C₆H₆, dried, and preserved in stoppered flasks. It can be sterilised in Roux tubes by heating for 24 hr. at 120°. For experimental purposes the sterile skin can be wet-back by allowing it 12 hr. in contact with 10 c.c. of sterilised H₂O. The method has been used to study the sweating process of hair-loosening (*L*). *L* is effected by all species of gelatin-liquefying bacteria, but not by non-gelatin-liquefying bacteria. The *L* bacteria are those commonly found in the air and H₂O. Exposure of sterile skin to the air for 1—2 min. is sufficient to provoke *L*. All these bacteria have an optimum *p*_H between 6.7 and 7.1, and optimum temp. of 30—35° except for a fluorescent bacillus, in which case it is 15—20°. The best *L* results are given by *B. mesentericus*. The soaking-back of sterile skin was facilitated by the presence of a non-proteolytic organism. D. W.

Preparation and properties of isoelectric collagen. E. ELÖD and W. SIEGMUND (Collegium, 1934, 281—285).—Isoelectric collagen prepared in the authors' type of electrodialyser (cf. B., 1934, 724) from bated and non-bated calfskins, respectively, had *p*_H 5.7 ± 0.1, which remained unchanged when the pelt was converted into

gelatin. The isoelectric point of calfskin diminished as the time of liming was prolonged. D. W.

Modern gelatin factory. ANON. (Food, 1934, 3, 377—380).—An illustrated description.

Measuring air-permeability.—See V. Electro-dialyser.—See XI.

See also A., July, 779, Quebracho tannin.

PATENT.

Manufacture of synthetic tans. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 411,390, 19.12.33).—The condensation of sulphonated PhOH, C₁₀H₇OH, and homologues with CH₂O and derivatives is carried out in presence of NH₃ or an amine in addition to a fixed alkali (e.g., with hexamine in place of CH₂O). H. A. P.

XVI.—AGRICULTURE.

Structure of soil and its temperature. J. APSITS (Z. Pflanz. Düng., 1934, B, 13, 247—269).—Relationships are traced between daily and seasonal variations in temp. at different soil depths, the closeness of packing of the soil particles, and the growth of crops. A. G. P.

Capillary water and pore space in soils. J. C. DRĂGAN and A. VASILIU (Bul. Acad. Inalte Stud. Agron. Cluj; Proc. Internat. Soc. Soil Sci., 1934, 9, 68—69).—Relationships between pore space, capillary and non-capillary H₂O, and mechanical composition in soils are examined. A. G. P.

Reclamation of moorland. W. G. OGG and I. M. ROBERTSON (Empire J. Exp. Agric., 1934, 2, 163—173).—A review of modern methods. A. G. P.

Influence of lime on reaction of subsoils. A. W. BLAIR and A. L. PRINCE (J. Agric. Res., 1934, 48, 469—473).—In the soil examined, heavy applications of CaCO₃ (2000—4000 lb. per acre) over 25-year periods changed the *p*_H of surface soil and subsoil (6.6—13.0 in.) to approx. the same extent. A. G. P.

Manurial effectiveness of ammonium phosphate. I. Introduction and historical. A. H. LEWIS and K. J. SINCLAIR (Empire J. Exp. Agric., 1934, 2, 154—162).—A review of the literature. A. G. P.

Organic manures. XI. Nitrogen compounds in rice and wheat straw. XII. Putrefaction products of *Astragalus sinicus* ("Genge"). K. YOSHIMURA and T. IWATA (J. Sci. Soil and Manure, Japan, 1933, 7, [4]; Proc. Internat. Soc. Soil Sci., 1934, 9, 92).—During the decomp. of "Genge" all org. bases except adenine were decomposed and approx. 76% of the total N was transformed into NH₃. A. G. P.

Ensilage trials at different temperatures. C. WINDHEUSER [with G. SCHWEIZER and O. HOFFMANN] (Landw. Versuchs-Stat., 1934, 120, 119—128).—Warm-fermentation processes produce silage having little or no PrCO₂H and also less AcOH and lactic acid and higher *p*_H than silage produced by cold-fermentation methods. A. G. P.

Biological activity of blast-furnace slag. G. VON STRÜNCK (Landw. Jahrb., 1934, 79, 241—256).—The favourable influence of the slag on nitrifying and N-fixing

bacteria in soil is superior to that of CaCO_3 . Probably other constituents (Si, Mn, Mg) are concerned in this effect. A. G. P.

Determination of the potassium requirement of soils by the König-Hasenbäumer citric acid method. P. RINTELEN and R. BALKS (Landw. Jahrb., 1934, 79, 323—333).—The satisfactory nature of the method (B., 1930, 257) in comparison with field manurial trials is shown. The limiting val. (160 mg. K per kg.) is somewhat too high for heavy soil types. A. G. P.

Influence of nitrogen, phosphorus, potassium, and calcium on decomposition of organic matter in soil. S. OSUGI and M. AOKI (J. Sci. Soil and Manure, Japan, 1933, 7, [4]; Proc. Internat. Soc. Soil Sci., 1934, 9, 72—73).—The rate of decomp. (I) of filter paper and rice straw was closely related to the p_H of the soil under dry and paddy field conditions. (I) was increased by additions of N, P, or K to soils deficient in these elements and by liming acid soils. A. G. P.

Intake of nitrate- and ammonia-nitrogen at different soil reactions. K. NEHRING (Landw. Jahrb., 1934, 79, 481—507).—The growth and N intake of various crop plants is examined in acid mineral soils, the reaction of which was modified by additions of varying proportions of CaO . At all reactions the growth of mustard supplied with NO_3^- was $>$ that with urea or $(\text{NH}_4)_2\text{SO}_4$, differences being most marked under the more acid conditions. No relationship was apparent between the intake of Ca and of N. With acid-tolerant plants (oats, summer rye) the N intake from the different sources was approx. the same and was only slightly influenced by p_H . Acid-sensitive crops (I) (barley, summer wheat, maize) responded more readily to NO_3^- in acid and to NH_4^+ in slightly alkaline conditions. In neutral soils both forms of N were equally effective. In plants less sensitive to acid the Ca, and in some cases the N, content increased with p_H in the range p_H 5—8. In (I) the N and Ca contents frequently declined with rising p_H . At all reactions the Ca intake of plants receiving $(\text{NH}_4)_2\text{SO}_4$ was $>$ that of those supplied with NaNO_3 . The proportion of amide-N: protein-N in oats grown with NO_3^- was $>$ that in plants receiving $(\text{NH}_4)_2\text{SO}_4$. A. G. P.

Examination of humus manures. M. POPP and J. CONTZEN (Landw. Versuchs-Stat., 1934, 120, 107—118).—Analytical data of several samples are recorded. The val. of org. manures cannot be based only on their contents of the essential nutrients. The importance is emphasised of the rate of decomp. of the org. constituents when mixed with soil, and also the effect of the manure on the course of nitrification. A. G. P.

Reciprocal effects of colloidal silica, phosphoric acid, and potassium on plant growth. W. DIX and E. RAUTERBERG (Z. Pflanz. Düng., 1934, B, 13, 233—246).—Varied effects of colloidal SiO_2 on growth of plants are attributable in part to chemical action in relation to nutrition, but in many cases to its influence on the H_2O relationships of soil. Both the H_2O supply and the concn. of nutrients in the soil solution are thus affected. The influence of the size distribution of soil particles on plant growth varies considerably with different plant species. A. G. P.

Spectrographic chemical analysis of certain constituents of [plant] ashes and soils. T. TSUGE (J. Sci. Soil and Manure, Japan, 1933, 7, [4]; Proc. Internat. Soc. Soil Sci., 1934, 9, 107).—Technique is described for determination of K, Sr, and Li, using flame spectra, and of Ba, Rb, and Cs, using the arc. A. G. P.

Potassium fertilisation of cotton. D. V. KHARKOV and L. N. PERSHAKOVA (Fertilisers for Cotton, 1933, No. 1, 38—47).—On central Asian soils K is effective only in combination with N and P_2O_5 . CH. ABS.

Influence of potassium on cotton. O. F. TUEVA (Fertilisers for Cotton, 1933, No. 1, 48—51).—K alone extends the period of flowering. In moderate quantities it increases the total leaf surface (I); increased applications of KCl decrease (I). CH. ABS.

Influence of nitrogen and phosphoric acid fertilisers on yield of cotton in pot experiments. D. A. SABININ, G. A. BOGDASARYAN, G. D. PANFILOVA, and M. I. POROVA (Proc. All-Union Sci. Res. Inst. Cotton Culture and Ind., 1931, No. 37, 36 pp.).—High applications of N retard germination, formation of bolls, flowering, and maturity. Addition of superphosphate counteracts the inhibitory effect of N. The relation of yield increases to the application of mixtures of N and P_2O_5 appears more complex. CH. ABS.

Influence of nitrogen and phosphoric acid on speed of growth and yield [of cotton] under conditions of pot experiments. O. F. TUEVA (Fertilisers for Cotton, 1933, No. 1, 52—59).—A high P_2O_5 : N ratio in the fertiliser accelerates blooming and maturation. N alone retards maturity. CH. ABS.

Composts and fertilisers in relation to green keeping. II. Nitrogenous fertilisers. T. W. EVANS (J. Board Greenkeeping Res., 1933, 3, 99—103).—The use and effects of soot, dried blood, hoof and horn meals, leather, shoddy, sewage sludge, oil cakes, malt culms, and spent hops are discussed. CH. ABS.

Grain-quality control of irrigated wheats of the Transvolga areas. N. PETINOV (Compt. rend. Acad. Sci. U.R.S.S., 1934, 2, 373—375).—Irrigated wheat may be of as good quality as that grown in non-irrigated areas, provided due consideration is given to selection of varieties and to appropriate systems of irrigation (I). Simultaneous increases in yield and protein content are possible with suitable (I). A. G. P.

Manuring and baking quality of bread cereals. O. NOLTE (Landw. Jahrb., 1934, 79, 405—414).—The effects of various systems of manuring and liming are examined. A. G. P.

Experiments with leguminous crops at Ibadan, Southern Nigeria, 1925—1933. O. T. FAULKNER (Empire J. Exp. Agric., 1934, 2, 93—102).—Green manure crops (I) (legumes), burned on the field, improve the subsequent crop. Cutting and removal of the aerial portion of the crop considerably reduces, but does not eliminate, its beneficial action. The effect of (I) is exhausted by one succeeding crop. A. G. P.

Sugar cane and sugar-cane soils. II. Immediate and residual effects of organic manures on

crop yield: "pen manure" in comparison with inorganic manures. P. E. TURNER (Empire J. Exp. Agric., 1934, 2, 103—118; cf. B., 1934, 340).—The residual action of pen manure (I) may persist over four successive crops. Inorg. N also shows residual effects, but these decline more rapidly than those of (I). The yield val. per unit N in inorg. fertilisers is $>$ that of (I). In some cases applications of (I) and $(\text{NH}_4)_2\text{SO}_4$ (II) produced no greater yield than (II) alone. Increments due to (I) are reduced by dressings of CaO . (I) is an inadequate source of K for canes. The action of sheep and fish manures is compared with that of (I).

A. G. P.

Acidity and manganese content in soils from tea farms. K. YAMADA (J. Sci. Soil and Manure, Japan, 1934, 8, [1]; Proc. Internat. Soc. Soil Sci., 1934, 9, 72).—No relationship was apparent between the acidity of these soils and their Mn contents or crop yields.

A. G. P.

Snowmould of turf grasses caused by *Fusarium nivale*. A. S. DAHL (Phytopath., 1934, 24, 197—214).—"Snowmould" was increased by late autumn application of fertilisers, or by covering turf with straw, and is more prevalent in soils containing much org. matter. Satisfactory control was obtained by application of HgCl_2 at the rate of 3 oz. per 1000 sq. ft.

A. G. P.

Determination of sulphur [fungicide] on leaves by titration. C. G. SMALL (Phytopath., 1934, 24, 296—299).—S is removed from treated leaves by CCl_4 and after evaporation of the solvent is boiled with standard aq. NaOH till completely dissolved. The product is oxidised to Na_2SO_4 by H_2O_2 and residual NaOH is determined by direct titration.

A. G. P.

Injury from calcium arsenate-hydrated lime spray on snap beans retarded in growth by unfavourable soil conditions. L. W. BRANNON (J. Agric. Res., 1934, 48, 447—451).—Injury by As resulting in severe chlorosis and heavily reduced yields occurred on soils having p_{H} 7.0 and 7.6, but not on those having p_{H} $<$ 6.0.

A. G. P.

Cabbage club-root in muck soils. J. D. WILSON (Ohio Agric. Exp. Sta. Bimo. Bull., 1934, 19, 58—65).—Club-root is not severe in soils having p_{H} 7.3—7.4, and liming to attain this reaction is normally a sufficient precautionary measure. $\text{Ca}(\text{OH})_2$ was more effective than were other liming materials examined. Among customary fungicides only Hg preps. showed appreciable efficiency. $\text{Ca}(\text{OH})_2$ was more effective in greenhouse than in field soils.

A. G. P.

Control of *Septoria* leaf-spot in celery. E. ELSSMANN (Z. Pflanzenkr. Pflanzenschutz, 1934, 44, 192—205).—Trials with various Cu sprays are recorded. Results obtained are largely influenced by weather conditions.

A. G. P.

Apple spraying and dusting experiments, 1928—1932, in relation to scab, yield, and tree growth. D. FOLSOM (Maine Agric. Exp. Sta. Bull., 1933, No. 368, 417—501).—Various forms of S fungicides are compared. Although seasonal and soil differences are to be considered, CaO-S sprays gave the best control with min. injury to trees.

A. G. P.

Fungi and bacteria as indicators of the effects of petroleum oils on apple leaves. P. A. YOUNG (Phytopath., 1934, 24, 266—275).—A general parallelism is demonstrated between the tolerance of fungi and of apple leaves to petroleum oils having $<$ 11% of sulphonatable matter. A technique for predicting oil injury in apple is based on this phenomenon. A. G. P.

Control of *Phytophthora* heart rot of pineapple plants. F. P. MEHRICH (Phytopath., 1934, 24, 173—196).—Best results were obtained by use of 1-0-7-3 Bordeaux mixture as a dip prior to planting. Other methods of applying Cu were inferior. The total concn. of the mixture may be doubled or that of either constituent varied by 50% without injury to the plants.

A. G. P.

Dormant sprays and their use for the control of insect pests of fruit trees in Rogue River Valley. L. G. GENTNER and R. K. NORRIS (Oregon Agric. Exp. Sta. Bull., 1933, No. 321, 55 pp.).—For control of pear blister-mite, dormant oil sprays (4%) prepared with oils having viscosity (Saybolt) 100—120 sec. and sulphonation test 50—70% may be satisfactorily applied to nearly all varieties up to the period of separation of the cluster buds. Application towards the end of this period may retard the development of lateral leaf buds on young wood, but the later growth of trees is not appreciably affected. Winter-strength CaO-S sprays (12 pts. in 100) had no ill-effects unless used late in spring, and were more effective than dry CaO-S for scale insects. Female scales covered with CaO-S may survive but are sterile.

A. G. P.

Pyrethrin.—See XX.

See also A., July, 752, Classification of forest humus types.

PATENT.

Manufacture of fertilisers by alkaline digestion of cellulosic materials. H. R. MURDOCK, Assr. to CHAMPION FIBRE CO. (U.S.P. 1,933,445, 31.10.33. Appl., 3.7.30).—The alkaline waste liquor produced by digesting cellulosic material with aq. KOH containing a smaller amount of K_2S is neutralised with HNO_3 and H_3PO_4 or their acid salts.

F. R. E.

XVII.—SUGARS; STARCHES; GUMS.

Sugar factories and sugar machinery. W. KILPATRICK (Proc. Inst. Mech. Eng., 1933, 125, 615—684).—An outline of cane-sugar manufacture is given, with illustrated notes on the design and layout of plant. New forms of hydraulic pressure regulators and connecting gear shaft coupling for cane mills are described. There is scope for thermal economy in juice evaporation and boiler firing. Average bagasse containing 49% of H_2O has 4285 B.Th.U. per lb., and about 14% of this heat is absorbed by the H_2O present, assuming 27° as the initial temp. Some of the flue-gas heat could with advantage be used to preheat the air supplied to the furnaces. With efficient use of evaporators and suitable design of boiler plant a factory can run on bagasse alone even when the fibre content of the cane is only 10.5%. For the burning of bagasse modern types of hearth furnace are much more efficient than step-grate types. Concluding remarks deal with the layout of cane-sugar

factories, and an appendix gives a tabulated analysis of costs for a West India factory. J. H. L.

Best decolorisation of thin and thick juices [from sugar beets]. O. SPENGLER, F. TÖDT, and S. BÖTTGER (Z. Ver. deut. Zucker-Ind., 1934, 84, 265—282).— SO_2 is best applied to the filtered thin juice from the final carbonatation. This procedure was studied by working with 2-litre portions of different thin juices, carrying out the sulphitation at 90° , boiling for 1 min., filtering, and evaporating in a vac. apparatus. All colour comparisons were made at the concn. and p_{H} val. of the unsulphited thin juice. It was found that, in relation to the quantity of SO_2 used, the decolorising effect is greatest for quantities up to 0.03—0.05% of SO_2 on juice solids; only slight further improvement results from larger quantities within practical limits. The quantity mentioned lessens the colour of the thin juice by about 3° Stammer (calc. on 100° Brix) and almost or entirely prevents darkening during evaporation; about 0.01—0.02% of SO_2 (on juice solids) is consumed before, and about an equal quantity during, evaporation, so that $< \frac{1}{2}$ of the added SO_2 remains in the thick juice, and the final molasses should contain $< 0.07\%$ of SO_2 . The exact quantity of SO_2 required to give these results varies with different juices, but it should be such that when the treated thin juice enters the evaporators it contains about 0.003—0.004% of SO_2 . If sulphitation is applied after instead of before evaporation less SO_2 is required, e.g., 0.002—0.003% calc. on thin juice, but it is much more effective before. The relative decolorising efficiencies of SO_2 in the free state and in the form of NaHSO_3 and Na_2SO_3 were found to be 1 : 0.8 : 0.65, on an average, subject to marked exceptions. J. H. L.

[Sugar]-boiling control by means of electrical conductivity. A. POLHAUSEN (Z. Ver. deut. Zucker-Ind., 1934, 84, 283—295).—At the Froebeln beet-sugar factory during last campaign vac. pans were fitted with two pairs of electrodes (B., 1933, 406), one above and one below the calandria. The upper pair were usually covered only during the last third of the full-boiling period, and normally gave current readings several milliamp. below those of the lower pair. The lower pair frequently reacted abnormally to syrup intakes, showing a delayed instead of an immediate increase of conductivity and sometimes no increase. This was attributed to defective circulation and accumulation of sugar at the bottom of the pan; it could be remedied by injection of steam from a small coil (Schnatter) at the bottom of the pan for a short time, and this also improved the colour of the sugar obtained. Strikes of high purity (98%) required higher voltages than raw sugar strikes, to obtain useful readings. The system is a valuable aid in sugar-boiling. J. H. L.

Waste wood.—See IX. **Sugar cane.**—See XVI.

See also A., July, 748, **Comparator for p_{H} determinations.** 749, **Determining the activity of the H⁺ in sucrose solution.** 759, **Prep. of l-ribose, β -d-allose, l-allose, and l-altrose.** New isopropylidene sugar. 819, **Determining starch in plant tissues.**

PATENTS.

Treatment of starch. DEUTS. HYDRIERWERKE A.-G. (B.P. 409,627, 13.12.33. Ger., 15.12.32).—The

production of cold-swelling starch products from raw starch by action of alkalis or alkaline salts is facilitated by a small addition of sulphonates or sulphuric esters of higher aliphatic alcohols, or their alkali salts. J. H. L.

Manufacture of durable pastes from endosperms of seeds of the carob tree and related plants. TRES CHEM.-PHARM. IND. U. HANDELS A.-G. (B.P. 409,549, 15.8.33. Austr., 26.8.32).—About 0.01—0.2% of Na_2SiF_6 is added to the mucilage, or is incorporated in course of manufacture, to prevent fermentation, increase η , and improve the colour. J. H. L.

Removing colloids from juices.—See I. **Cellose.**—See V. **Yeast from molasses.**—See XVIII.

XVIII.—FERMENTATION INDUSTRIES.

Application of enzymes to industrial purposes. A. HESSE (Chem.-Ztg., 1934, 58, 569—572).—A review.

Changes taking place in pressed yeast on storing. W. IWANOWSKI and K. BRZEZIŃSKI (Przemysl Chem., 1934, 18, 93—101).—Parchment paper and Cellophane are unsuitable for packing pressed yeast (I). Autofermentation takes place in the (I), without any marked proteolytic action, up to the moment of liquefaction of (I), which takes place when $> 10\%$ of the cells are dead. The p_{H} does not vary greatly, remaining at < 7 even during the first few days after liquefaction. The intensity of the processes taking place increases with rise in temp.; (I) may be stored at 0° for > 3 months without deterioration. R. T.

Theory of the oxidation-reduction potential and its importance in brewing. J. DE CLERCK (Bull. Assoc. Etud. Louvain, 1934, 34, 55; Woch. Brau., 1934, 51, 196—200, 204—207).—Modern ideas regarding oxidation and reduction are discussed, and an account is given of oxidation-reduction potential (I), r_{H} , the measurement of (I), and the application of these theories to physiology and to brewing. The measurement of r_{H} provides a means of control of aëration, and the stability of beers may be connected with their (I), whilst their aroma and taste are influenced by r_{H} . The multiplication of micro-organisms is dependent on the r_{H} of the medium. I. A. P.

Peculiar case of mannitic fermentation in a withered wine. M. VENEZIA (Annali Chim. Appl., 1934, 24, 260—266).—A wine made from sound grapes, carefully withered, and fermented at 10 — 11° contained mannitol, although its organoleptic and chemical properties gave no indication of alteration. T. H. P.

See also A., July, 728, **Application of capillary analysis [to wines].** 745, **Micro-determination of H_3BO_3 .** 807, **Aldehydease from liver.** 808, **Prep. of enzymically pure proteinase.**

PATENT.

Production of yeast and spirit from sugar-containing liquids, more particularly molasses. E. STICH (B.P. 411,611, 3.3.33).—The fermentation period is divided up into a no. of short intervals—conveniently of 1 hr. each—and a regulated supply of finely-divided air, limited to > 10 times the quantity of mash, is given over each period, together with a regulated supply of molasses (I) to obtain a definite production of

yeast and EtOH. The air supply regulates the growth of the yeast, and the requisite amount of air and (I) for each period can be calc., since they are substantially the amounts necessary to give growth corresponding to the strict exponential curve for yeast. The min. usage of air and (I) in this way yields the max. of yeast and EtOH.

I. A. P.

XIX.—FOODS.

Determination of moisture in bread. L. BELLUCCI (Annali Chim. Appl., 1934, 24, 236—241).—Owing to the difficulty of obtaining a small sample representative of a loaf, 50 g. sampled systematically are distilled with a 1:1 mixture of C_6H_6 and PhMe (b.p. 89°) and the H_2O is measured in a graduated tube. This gives results agreeing well with those found on drying 50 g. at 105 — 110° to const. wt., although the Italian official method of drying 10 g. at 105 — 110° for 5 hr. gives appreciably higher figures.

T. H. P.

Physico-chemical properties of milk. D. RAFFAELI (L'Ind. Chimica, 1934, 9, 475—479).—The oxidation-reduction potential, electrical conductivity, isoelectric point, surface tension, and f.p. of milk are discussed in relation to the effects of storage conditions, boiling, inoculation with various bacteria, and adulteration.

H. F. G.

Homogenisation of milk products. L. H. LAMPITT and M. BOGOR (Chim. et Ind., 1934, 31, Spec. No., 1004—1009).—The applications of homogenisation (I) in the dairy industry are reviewed. A method is described by means of which the (I) of milk, or admixture of untreated with homogenised milk, may be detected.

E. C. S.

Problem in fruit preservation. Studies on *Byssoschlamys fulva* and its effect on the tissues of processed fruit. M. OLLIVER and T. RENDLE (J.S.C.I., 1934, 53, 166—172).—The tissues of processed fruit are readily disintegrated by *Byssoschlamys fulva* (I) even under reduced O_2 tension, owing to the destruction of pectinous substances. Its appearance and behaviour on various culture media, and its effect on ripening and processed fruits, are described. The softening is rarely accompanied by gas production, no odour is produced, and only a slightly sour taste is noticeable. (I) is probably associated with the soil. The ascospores resist a temp. of 86 — 88° for 30 min. in many fruit syrups. Methods of control are discussed.

E. C. S.

Cacao fermentation in West Africa. A. W. KNAPP (J.S.C.I., 1934, 53, 151—158).—Whilst the standard of prep. on the Gold Coast is, in general, improving, the cacao produced still contains about 5% of unfermented beans. The West African methods of fermentation are described. Experiments with wooden boxes, baskets, or plantain stem frames gave similar products, in all cases preferable to that obtained by fermentation in heaps. Unripe cacao gave an inferior product and over-ripe cacao gave good beans but brittle shells. During fermentation high temp. are rapidly reached—in native heaps as high as 50° in 3 days. Yeasts with an optimum temp. of 40° are partly responsible, assisted possibly by acid-producing bacteria and definitely, in certain cases, by thermophilic moulds. The moulds occur only in those heaps which are not

mixed or turned. Alternative methods to fermentation failed to give beans with a full chocolate odour and flavour. During sun-drying after fermentation, oxidation of the tannins continues as long as the moisture is $>8\%$, the solar temp. being favourable to the activity of the oxidase. It is concluded that although good cacao can be obtained by the use of baskets and stem frames, the best kind of container is the wooden box. A considerable improvement in quality resulted if the cacao in heaps and containers was well and rapidly mixed every 2 days.

Determinations of the proportions of coffee and chicory in coffee mixtures. E. B. HUGHES and W. WISE (J.S.C.I., 1932, 53, 189—192).—A modified apparatus is described for determinations by the extraction method and results are given for a large no. of samples of roasted coffee of different varieties and also for roasted chicory. For the d of 5% wt./vol. extract of coffee, corr. for moisture originally in the roasted coffee, a suitable general figure is 1.0058, and for chicory 1.0143. The d of the coffee extract is but little affected by the degree of roasting of the coffee, but for chicory the extent of roasting may have a large effect.

E. B. H.

Influence of steam- and air-dried cod and herring meals and of vegetable protein foods on the weight increase and carcass quality [of pigs]. A. BÖMER, P. RINTELEN, W. HELMS, F. HONCAMP, W. KLEBERGER, V. HORN, C. KRANNICH, and P. MALKOMESIUS (Landw. Versuchs-Stat., 1934, 120, 16—105).—In comparative tests the efficiency as protein concentrates, as judged by live-wt. increases, was in the order: high-fat herring meal (I) $>$ steam-dried cod meal (II) $>$ air-dried (II) $>$ soya bean (III). Differences between the fish meals were small. (III) was definitely inferior. A slight fishy flavour and odour due to feeding fish products was apparent only in the liver and brain and persisted in sausages containing these. The effect was rather more marked in the case of (I).

A. G. P.

Waste wood.—See IX. [Waste] products from soy factory. —See XII. Milk waste. —See XXIII.

See also A., July, 1939, Prep. of gluco-protein. 796, Solids-not-fat contents, and P compounds, of milk. 816—8, Vitamins (various).

PATENTS.

Preparation of coffee extract. L. G. COPES, Assr. to BEST FOODS, INC. (U.S.P. 1,933,049, 31.10.33. Appl., 3.10.29).—A prep. is obtained by drying and roasting the aq. cold or hot extract of crushed raw coffee beans.

E. B. H.

Soluble coffee. L. G. COPES, C. H. HAURAND, and E. KELLOGG, Assrs. to BEST FOODS, INC. (U.S.P. 1,932,769, 31.10.33. Appl., 1.2.30).—The constituents of green coffee coagulable by heat are removed by preheating the green beans to a suitable temp. with H_2O . The extract is filtered, dehydrated, and finally roasted.

E. B. H.

Ice cream for diabetics. R. H. HASKINS, SEN., and R. H. HASKINS, JUN. (U.S.P. 1,933,732, 7.11.33. Appl., 29.10.32).—Glycerin, to control the f.p., and other constituents such as acacia, NaCl, eggs, and saccharin are added to unsweetened ice cream. B. M. V.

Treatment of [wooden] food-carrying vehicles. J. E. SHEPHERD, Assr. to NAT. COLD STEAM CO. (U.S.P. 1,934,826, 14.11.33. Appl., 4.4.28).—A wooden refrigerator car or the like is cleaned by the heat and dynamic force of steam at 150 lb./sq. in.; disinfectants are introduced in the high-pressure blast towards the end of the process. B. M. V.

Vac. drum-dryer [for milk].—See I.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Reaction for characterising novocaine and methods for determining novocaine and stovaine. J. A. SANCHEZ (Ann. Chim. Analyt., 1934, [ii], 16, 249—252).—Unlike stovaine and cocaine, novocaine and tutocaine afford a scarlet colour with one drop of a mixture of 10 c.c. of saturated aq. furfuraldehyde and 5 drops of AcOH. The HCl in the drug is determined by titrating 0.1 g. in aq. EtOH with 0.1N-NaOH (to phenolphthalein), and the base in this solution is then determined with 0.1N-H₂SO₄ (to rosolic acid).

J. G. A. G.

Industrial synthesis of guaiacol, and prospects of its realisation. M. DOMINIKIEWICZ [with M. SCHLEYEN] (Arch. Chem. Farm., 1934, 1, 1—28).—The usual method of synthesis of guaiacol from PhCl is more economical than from *p*-C₆H₄Cl₂ by Turski, Piotrowski, and Winawer's method (B., 1927, 243). R. T.

Belladonna extract prepared by fermentation. J. HUZUM (Boll. Chim.-Farm., 1934, 73, 371).—1 kg. of the leaves or root is boiled with 4—5 kg. of H₂O and the decoction is left to ferment until it becomes acid, superficial *Aspergillus* colonies appearing and the starch, saccharine, and mucilaginous matters being largely decomposed, whereas the alkaloids remain combined with the acids formed. After pressing, the residue is again macerated and pressed after 12 hr. The liquid is boiled gently to about 1 litre and the scum, containing wax and proteins, removed. The filtered liquid is then evaporated on a H₂O-bath or in a vac. to the consistency of a soft extract; this is completely sol. in H₂O.

T. H. P.

Determination of strophanthin in strophanthus seeds and tinctures. J. OPIEŃSKA-BLAUTH (Arch. Chem. Farm., 1934, 1, 29—51).—*Strophanthus Kombé* (I) seeds give a permanent emerald-green coloration with 80% H₂SO₄, *S. hispidus* (II) a reddish-brown changing to violet, and *S. gratus* (III) a permanent carmine-red coloration; the reactions are best given by the endoderm. Strophanthin (IV) can be determined in (I) or its tinctures by a method similar to that specified in the D.A.B. VI for (III), viz., isolation as cryst. (IV). A condition for successful crystallisation of (IV) is the previous thorough removal of light petroleum-sol. substances from the material. Cryst. (IV) cannot be obtained from (II).

R. T.

Pyrethrin content and insecticidal action of Dalmatian pyrethrum. E. PROFFT and A. KÖRTING (Landw. Jahrb., 1934, 79, 415—430).—Limits of variation in pyrethrin content (I) of flowers from various sources are wider than is usually supposed. Although a general parallelism exists between (I) and insecticidal

action on *Calandra granaria*, the chemical determination of (I) is not an exact unit for measuring toxicity. Storage of pyrethrum powder, even in sealed vessels, resulted in considerable losses of active constituents, especially at higher temp. A. G. P.

Artemisia plants from the coasts of England and Wales. ANON. (Bull. Imp. Inst., 1934, 32, 33—41).—Santonin contents of air-dried fine shoots, leaves, and flower heads of *A. maritima* (6 samples with 0.5—1.3%, 11 with 0.2—0.5%, 3 with < 0.2%) and *A. gallica* (3 with 0.5—0.8%, 4 with < 0.2%) from different British localities are given. E. H. S.

Preservation of concentrated decoctions. G. SOLLAZZO (Boll. Chim.-Farm., 1934, 73, 369—370).—Decoctions of althea, senega root, rhubarb, condurango bark, cinchona bark, senna leaves, camomile, etc., which will keep for years, may be prepared by boiling 100 g. of the drug with 200 g. of H₂O, filtering, adding 100 g. of doubly-distilled glycerol, and evaporating all the H₂O on a H₂O-bath at < 60°. The product contains all the active principles and requires only dilution before use. T. H. P.

Cypress-nut oil. Q. MINGOIA (Annali Chim. Appl., 1934, 24, 247—257).—This steam-distilled oil contains α -pinene (about 80%), camphene, cymene, camphor, and formic, acetic, and butyric esters of α -terpineol. It has d_{20}^{25} 0.8777, n_D^{25} +26.47°, n_D^{18} 1.4723, solubility 1:7 vols. in 95% and 1:80 vols. in 90% EtOH, acid val. 0.584, ester val. 9.59 (after acetylation 14.34), esters (as C₁₀H₁₇OAc) 3.35%, total alcohols (as C₁₀H₁₇OH) 3.93%, and free alcohols 1.30%. The analytical procedure used is described. T. H. P.

Content and quality of oil from various species and varieties of valerian. W. J. STRAŻEWICZ (Arch. Chem. Farm., 1934, 1, 108—114).—The roots and rhizomes of three varieties of *Valeriana offic.*, L. had the same content (0.9%) of oil, of approx. the same composition. *Valeriana sambucifolia*, Mik. has a somewhat lower oil content (0.25—0.7%), the physical consts. of the oil differing from those of the above species, whilst Japanese material has 2.9% of oil, differing considerably in physical properties from the above. (Cf. B., 1933, 333.) R. T.

See also A., July, 754, Detection of "peroxide" in Et₂O. 758, Catalytic reduction reactions. 777, Perfume of curcuma oil. 780, Rotenone. 783, Hypnotics. 787—8, Alkaloids (various). 790, Reagent for carbonyl compounds. 791, Detection of nicotine. Microchemistry [of drugs etc.]. 812, Fungicidal quality of olive oil ozonide. 816—8, Vitamins (various). 820, Constituents of *Ceanothus velutinus*.

PATENTS

Therapeutic agents. F. DUNNING, Assr. to HYNSON, WESTCOTT, & DUNNING, INC. (U.S.P. 1,932,886, 31.10.33. Appl., 25.3.33).—Use of halogenated *o*-hydroxybenzyl alcohols as antiseptics, antispasmodics, and anaesthetics is claimed. H. A. P.

Production of liquid chlorothymols and chlorocarcacrols. E. MOMM (B.P. 411,430, 28.11.32).—

Thymol and carvacrol or mixtures of these are chlorinated at the m.p.—the b.p. (100°) until 0.5—2.8 mols. of Cl have been introduced. The products, which are chlorinated largely in the Pr group, are powerful bactericides and antiseptics. H. A. P.

Obtaining growth-exciting substances from thymus glands. SOC. CHEM. IND. IN BASLE (B.P. 411,690, 30.6.33. Switz., 1.7.32).—A H_2O -sol. extract of the glands is extracted with an aq. aliphatic alcohol and the solid material is recovered. This may be further purified by salting out from its aq. solution with a mineral salt solution. E. H. S.

Preservation of biological specimens. P. JOFFE, 1,935,706, 21.11.33. Appl., 8.4.29).—The specimen is coated with liquefied $C_{10}H_8$, p - $C_6H_4Cl_2$, camphor, or other H_2O -repellent substance that forms a cryst. solid and is also capable of sublimation. The coating is rapidly solidified and then slowly sublimed. A small amount of colour preservative may be present. B. M. V.

Manufacture of organic mercury compounds. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 411,507, 2.12.32).—Ethers of hydroxyalkylmercuric salts in which the acid radical is such as will give a Hg salt insol. in the alcohol used are prepared from olefines stable to oxidation by HgO , HgO , and the appropriate alcohol and acid under conditions such that this Hg salt can form only slowly. Thus red or "aged" HgO is used, the acid is added slowly, or an acid giving a sol. Hg salt is used followed by metathesis either gradually during the reaction or afterwards. Thus C_2H_4 is passed into $MeOH$ containing $H_2C_2O_4 \cdot 2H_2O$ and red HgO at 30—40°, or yellow HgO and much HCO_2H (which retards formation of HgC_2O_4) are used, or $AcOH$ is used in place of $H_2C_2O_4$ and the product treated with $H_2C_2O_4$ in $MeOH$; the product in every case is methoxyethylmercuric oxalate, m.p. 165—166°. Similar methods are used to prepare the corresponding tartrate, m.p. 149—151°, sulphate, and succinate, m.p. 93°, ethoxyethylmercuric oxalate, sinters 280°, tartrate, and sulphate and benzyloxyethylmercuric oxalate, m.p. 136°. [Stat. ref.] H. A. P.

Therapeutic light source.—See II. Ice cream for diabetics.—See XIX.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

See also A., July, 740, Low-temp. sensitivity of films to X-rays.

PATENTS.

Reducing the electric excitability of photographic films made from highly polymeric colloids. I. G. FARBENIND. A.-G. (B.P. 411,689, 28.6.33. Ger., 2.7.32).—Films made from acetylcellulose, polyvinyl chloride, etc. are protected from static charges by coating with a layer of a salt of a polymeric carboxylic acid, e.g., polyglycuronic acid (NH_4 salt excluded), polymeric cinnamic acid, or the salts of mixed polymerisation products containing such acids, e.g., nitriloacrylic acid and acrylic acid mixed polymeride. J. L.

Production of printing surfaces for multi-colour printing. A. IRVINE (B.P. 411,718, 13.9.33).

Photographic light source.—See II.

XXII.—EXPLOSIVES; MATCHES.

See A., July, 743, Azido-compounds of Co. 767, Analogues of tetryl.

PATENTS.

Detonating cartridges for railway signalling. ETABLS. RUGGERI (B.P. 411,725, 26.9.33. Fr., 26.9.32).

High-explosive tracer shells. H. ROMBERG, H. SCHULER, and RHEINISCHE METALLWAAREN- U. MASCHINENFABR. (B.P. 411,381, 30.11.33).

XXIII.—SANITATION; WATER PURIFICATION.

Mechanisation of sewage treatment. E. B. BESSELEVRE (Sewage Works J., 1934, 6, 469—488).—Historical. The many forms of mechanical appliances used in the various stages of sewage purification and sludge disposal are described. C. J.

Filtration and incineration as a means of [sewage] sludge disposal. G. P. EDWARDS (Sewage Works J., 1934, 6, 444—449).—Vac. filtration of sludge, whether fresh, activated, or digested, is practical and economical. Labour and expensive equipment are eliminated and nuisance is avoided. It is independent of weather conditions and costs no more than drying on sand beds. Incineration offers a satisfactory method of final disposal of sludge, especially when dealing with fresh or activated material where odour trouble may be encountered. C. J.

Experiments in [sewage] trickling-filter ventilation. M. LEVINE (Sewage Works J., 1934, 6, 517—520).—Experiments carried out with a filter 2 ft. square and 6 ft. deep, and constructed of cinders 2 in. to $\frac{1}{2}$ in., indicate that adequate bottom ventilation produces materially improved results, particularly with regard to the biochemical O_2 demand. C. J.

Comparison of aëration systems for the activated-sludge process [of sewage purification]. H. J. N. H. KESSENER and F. J. RIBBIUS (Sewage Works J., 1934, 6, 423—443).—Since the determination of the "purification capacity" of an activated-sludge plant is difficult the "oxygenation capacity" (I) is suggested as a satisfactory means for the comparison of the different systems of aëration. (I) is the no. of g. of O_2 per hr. taken up in that plant by 1 cu. m. of fully deoxygenated distilled H_2O at 10°/760 mm. This rate proved to be considerably greater in clean H_2O than in sewage, and a very marked advantage shown for compressed-air over surface aëration (brush) with the former was not repeated when dealing with sewage, the colloidal org. matter present apparently having an adverse effect on the dissolution of O_2 from diffused air bubbles. C. J.

Results of six months' operation of chemical sewage-purification plant. G. H. GLEASON and A. C. LOONAM (Sewage Works J., 1934, 6, 450—468).—The results are given of the operation of the demonstration plant of the Guggenheim process at the Chicago North

Side works by which chemically clarified sewage is dealt with on zeolite filters with recovery of NH_3 and the sludge produced is converted into precipitant for re-use in the process. The plant has dealt with 25,000 gals. per day and has produced effluents slightly better than the large-scale activated-sludge plant at that works. Probable cost figures for larger-scale plants are given. C. J.

Effect of temperature and seeding on hydrogen sulphide formation in sewage. W. H. BAUMGARTNER (Sewage Works J., 1934, 6, 399—412).—Fresh sewage does not produce appreciable amounts of H_2S in 2—3 days, but inoculation from flora developed in the sewer during warm weather and rise in temp. up to 30° produce increasing amounts. The introduction of stale solids brings about decomp. in a few hr. SO_4 ions present in excess of the amount required to satisfy the O_2 demand of the org. material do not increase the production of H_2S . Glucose and NaHCO_3 up to 100 p.p.m. have no effect, but FeCl_3 in concns. of 10—20 p.p.m. stimulates production and later reduces by pptn. the amount of volatile sulphide. C. J.

Apparatus for determination of dissolved oxygen in sewage-sludge mixtures. E. J. THERIAULT and P. D. McNAMEE (Sewage Works J., 1934, 6, 413—422).—Owing to the high O_2 demand of activated sludge, rapidity of sampling and determination is of great importance. In the apparatus described, the dissolved gases are removed by vac. treatment and the O_2 determined by a modified Winkler method. The time required to take a sample and to separate the dissolved gases is approx. 15 sec. C. J.

Removal of manganese from Leipzig drinking water. L. KAATZ and H. E. RICHTER (Gas- u. Wasserfach, 1934, 77, 291—294).—Complete removal of Mn from H_2O by passage through a sand filter (I) is possible only if the H_2O is practically neutral; in acid H_2O pptn. of Mn is incomplete, and in too alkaline H_2O the activity of (I) is reduced owing to deposition of CaCO_3 on the sand grains. In making up a new filter about 20% of used sand should be mixed with the new sand and the rate of flow of H_2O should be low at first; in some cases addition of oxidising agents to the H_2O is necessary, despite the fact that the O_2 content of the H_2O may be sufficient to ensure complete pptn. of Mn. Cleaning of the (I) must not be carried too far as a thin film of MnO_2 is essential for successful operation. A. R. P.

Pollutional character of flax-retting wastes. E. F. HOWARD, G. W. GLEESON, and F. MERRYFIELD (Sewage Works J., 1934, 6, 596—600).—It is estimated that 5300 gals. of retting waste having an average biochemical O_2 demand (20-day) of 4900 p.p.m. are discharged per ton of flax straw. Pptn. with approx. 200 lb. of Ca(OH)_2 per ton of straw and biological filtration of the effluent will render the liquor suitable for disposal by dilution. C. J.

Milk-waste treatment in Wisconsin. H. RUF and L. F. WARRICK (Sewage Works J., 1934, 6, 580—595).—Trickling-filters of crushed rock (1—2 in.), 6—8 ft. deep, and having a capacity of 80 cu. ft. of rock per lb.

of biochemical O_2 demand (5-day) applied per 24 hr., will reduce the pollutional strength (S) of milk wastes by 80%. The quantities and S of wastes examined varied from 70 to 250 gals. in vol. and from 2.7 to 7.5 in population equiv. per 1000 lb. of milk intake at the condenseries. Pan- H_2O having a biochemical O_2 demand (5-day) of approx. 22 p.p.m. may be discharged direct to the drain. C. J.

PATENTS.

Purification of sewage and other impure liquids. ACTIVATED SLUDGE, LTD., and J. A. COOMBS (B.P. 411,425, 29.9.32 and 5.9.33).—In dry weather the period of max. strength of sewage roughly coincides with that of max. flow. Sewage treated by the diffused-air system of the activated-sludge process during this period is impounded by filling the aëration tanks to a considerably increased depth. Advantage is thus derived from the use of the more efficient "fill-and-draw" instead of the normal "continuous-flow" method of operation and from the increased time of stay in the aëration chamber. Forms of tank and float-operated apparatus are claimed by which the change-over may be made automatically and the necessary vols. of compressed air and return activated sludge provided. C. J.

Treatment of sewage. W. M. PLATT (U.S.P. 1,937,434, 28.11.33. Appl., 20.8.31).—Baffles adjacent to the vertical walls of aëration tanks are described, the circulation being by air-lift up the walls and down the centre. B. M. V.

Vermin destroyers [insecticides] and their manufacture. H. A. GILL. From A.-G. F. MEDIZINISCHE PRODUKTE (B.P. 410,364, 12.8.33).—The proposed effective agents are 20—30 pts. of powdered *Derris* root containing rotenone and 40—70 pts. of C_2Cl_6 , C_2HCl_5 , and/or C_2Br_6 . The mixture may be applied as a powder, chalk being added as filler, or dissolved in a hydrocarbon oil and emulsified with NH_4 linoleate and H_2O and used as a spray. C. J.

Water purification. A. E. BROUÉ (B.P. 410,936, 3.3.33).—A naturally occurring titaniferous ironsand, after the removal of the bulk of the SiO_2 and Fe oxides, is suitable for the softening and purification of H_2O and sewage. Its action is improved by heating at 540° with CaO , alkali salts, or clay. C. J.

Purification of water. H. RODMAN, Assr. to RODMAN CHEM. Co. (U.S.P. 1,933,567, 7.11.33. Appl., 6.1.31).— H_2O is rendered potable by agitation with coal or carbonaceous coke sufficiently finely divided to be kept in suspension; this treatment follows chlorination or oxidation with KMnO_4 , if necessary. B. M. V.

Purifying waste liquors containing sludge. W. W. TRIGGS. From GUTEHOFFNUNGSHÜTTE OBERHAUSEN A.-G. (B.P. 411,702, 19.7.33).—Sludge-containing liquor, e.g., coal wash- H_2O , which has been treated with or contains Ca(OH)_2 or other pptg. agents, is treated with a small quantity of an aq. emulsion of resinous hydrocarbons, e.g., waste residues from the working up of crude C_6H_6 . The sludge particles are clotted out and settle readily. C. J.

Building materials from refuse.—See IX.