

BRITISH CHEMICAL AND PHYSIOLOGICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JANUARY, 1938.

I.—GENERAL; PLANT; MACHINERY.

Tendencies of world power development. E. F. ARMSTRONG (*Nature*, 1937, **140**, 706—707).—A discussion of the present situation with regard to consumption of coal, oil, gas, wood, and H₂O power.

L. S. T.

Operating temperature of non-metallic (carborundum) heating elements. M. NAGAI and K. SUMI (*J. Electrochem. Assoc. Japan*, 1935, **3**, 258—261).—A good service life is obtainable at 1400°, the useful max. temp. being 1450°.

CH. ABS. (e)

Thermal agitation of liquids, their thermo-mechanical properties and thermal conductivity. R. LUCAS (*J. Phys. Radium*, 1937, [vii], **8**, 410—423).—Theoretical.

A. J. E. W.

Combination of the hydrodynamical and Langmuir's theories of heat transference. W. ELENBAAS (*Physica*, 1937, **4**, 761—765).—Theoretical.

K. S.

Desorption method [of producing very low temperatures]. F. SIMON (*Physica*, 1937, **4**, 879—898).—The desorption and condensation methods are compared and discussed. The former method is recommended for thermostatic purposes in the liquid H₂ and He ranges (cf. A., 1927, 100).

K. S.

Measurement of low temperatures. P. K. SAKMIN (*J. Chem. Ind. Russ.*, 1937, **14**, 1230—1231).—Polemical, against Slizkovskaja (B., 1937, 855).

R. T.

Heat-transfer tests on exhaust steam [boiler-water] preheater. C. KAMMERER (*Arch. Wärmewirts.*, 1937, **18**, 247—248).—Steam was passed around a nest of tubes through which a turbulent flow of H₂O was maintained. Measured and calc. coeffs. of heat transfer are plotted against rates of H₂O flow.

R. B. C.

Organic treatment of boiler [feed-]water. H. N. BASSETT (*Steam Eng.*, 1937, **6**, 406—407).—Methods of preventing scale formation in boilers by adding starch, linseed, pyrogallol, tannin, etc. to the H₂O are reviewed.

R. B. C.

Treatment of boiler water to prevent carry-over. J. J. MAGUIRE and J. T. TOPOLOSKY (*Paper Trade J.*, 1937, **105**, No. 13, 26, 28, 30).—A case of failure of superheater tubes within a week of their installation is traced to carry-over of foam which caused partial steam starvation with consequent over-heating. No appreciable scale was present. The foam was produced by an unusually high concn. of org. matter in the boiler H₂O. Coagulation could be effected with inorg. acids and salts, but the quantities required were so large as to preclude any

possibility of their use in practice. The elimination of entrained solids was accomplished by the use of a reactive org. colloid consisting of a peptised mixture of *Laminaria stenophyllia* and *L. digitata*, which was added to the boiler H₂O in the form of the Na sol. The high negative charge of the colloid micelle enabled relatively small quantities to be used. A rise in superheated steam temp. of about 40° was recorded.

H. A. H.

Testing the water-softening plant of the Chemische Fabrik Budenheim A.-G., Mainz (G.P. 625,184, 629,729, and 620,500). A. SPLITTGERBER (*Papier-Fabr.*, 1937, **35**, 425—429).—Boiler feed H₂O is softened by warming to 99° and passing at a fixed rate through a series of S-shaped pipes. At midway in the piping condensate make-up is added together with Na₃PO₄, and the H₂O finally filtered by passing through gravel of 2—3 mm. grain size. The softening action is complete in <1 min. and the H₂O is then completely de-aerated.

D. A. C.

Deposition of scale below b.p. E. G. BARBER (*Fuel Econ.*, 1937, **13**, 498—502).—Since Ca(HCO₃)₂ and Mg(HCO₃)₂, constituting temporary hardness of H₂O, start to decompose at temp. >27°, heating and cooling plant employing circulating H₂O may suffer great loss of efficiency even at relatively low temp. Apart from costly complete treatment, low-temp. scale formation may be prevented in surface condensers etc. by (1) acid treatment with 0.14 lb. of conc. H₂SO₄ and (2) alkaline treatment with 0.11 lb. of NaOH per 1000 gals. per degree of temporary hardness. Chlorination with 0.2—0.6 p.p.m. prevents formation of org. growths. Condenser scale may be removed by acid-cleaning with "inhibited" HCl.

A. K. G. T.

Economics of [boiler] feed-water blending. F. J. MATTHEWS (*Steam Eng.*, 1937, **6**, 372—374, 390).—A discussion.

R. B. C.

Chemistry of water conditioning. R. TRAUTSCHOLD (*Rayon Text. Month.*, 1937, **18**, 713—719).—An account of current practice.

A. G.

Applying colloidal chemistry to water conditioning. L. D. BETZ (*Oil and Gas J.*, 1937, **36**, No. 20, 49, 59—60).—A review of the colloid state.

J. W.

Heavy-duty bearings of phenolic plastics. H. M. RICHARDSON (*Inst. Mech. Eng., Lubrication discussion*, Oct., 1937, Group I, Suppl., 1—11).—A description with drawings of designs of these bearings in common use. Saving of 15—60% in power consumption has resulted from their use in rolling

mills. With proper service they have 3—15 times the life of metal bearings. Their success is due to the low modulus of elasticity of the material, resulting in greater compression so that there is a more even distribution of pressure throughout the film. The low k and comparatively low charring temp. of the material impose limitations. H. C. R.

Properties and performance of bearing materials bonded with synthetic resin. G. R. EYSEN (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group I, 78—86).—Typical designs of these bearings are given together with tables comparing the properties and coeff. of friction of the material with those of brass. The H_2O -cooled bearings are specially suitable for rolling mills. A satisfactory bearing material is obtained by impregnating fibrous fillers with resin from a thin aq. solution. H. C. R.

Rubber as a material for bearings. S. A. BRAZIER and W. HOLLAND-BOWYER (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group I, 30—37).— H_2O -lubricated rubber has a low frictional resistance and stands up remarkably well to abrasion and wear. It is largely used in under- H_2O marine work, high-speed motor boats, hydraulic turbines, centrifugal pumps, agitators, washing machines, and domestic and industrial liquid-handling equipment. Commonly used designs are illustrated. H. C. R.

Water-lubricated rubber bearings. A. FOGG and S. A. HUNWICKS (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group I, 95—100).—Friction and wear tests on plain and fluted rubber bearings at various conditions of speed, clearance, and loading are described. H. C. R.

Relating friction factor and Reynolds number. B. MILLER (Chem. Met. Eng., 1937, 44, 616—617).—The equation $1/\sqrt{(2f)} = 2.54 \log_{10} Re - 2.17$, in which f is the friction factor and Re the Reynolds no., holds for $\log_{10} Re$ from 3.5 to 6.5. A. G.

Measurements of elastic constants of materials by means of supersonic vibrations. L. BERGMANN (Z. Ver. deut. Ing., 1937, 81, 878—882).—A review. R. B. C.

Optical specification of light-scattering materials. D. B. JUDD [with W. N. HARRISON, B. J. SWEQ, E. F. HICKSON, A. J. EICKHOFF, M. B. SHAW, and G. C. PAFFENBARGER] (J. Res. Nat. Bur. Stand., 1937, 19, 287—317).—The materials considered are those which have a high reflectance and are nearly non-selective with respect to λ . It is shown that vitreous enamels, cold- H_2O paints, paper, and dental silicate cements can be specified by means of two consts., reflectivity and coeff. of scatter, in conformity with the Kubelka-Munk theory. The methods described can be used to differentiate fundamentally between various members of the same group of materials, and permit comparisons to be made between different groups. Materials of which the scattering elements are distributed in air (H_2O -paints, paper) have higher coeffs. of scatter than have air-free materials (enamels, cements). F. L. U.

Determination of the circulating load in a wet closed-circuit grinding system. F. C. BOND

(Min. and Met., 1937, 18, 507).—Screen analyses are avoided by a method using the liquid-solid relationship. The circulating load in a wet-grinding mill in closed circuit with any type of classifier is given by $(PF - C - DF)/(D - S)$ tons per hr., where F is the feed tonnage to the mill, C the new H_2O added to the classifier, and P , S , and D are the dilution of classifier overflow, return sand, and mill discharge, respectively. A. K. G. T.

Particle shape. H. H. STEPHENSON (Chem. and Ind., 1937, 726).—It is suggested that (a) the idea that the quantity of material passing through a sieve in unit time is periodic should be investigated with sieves of various hole shapes, and (b) particle size should be expressed by vectors with the c.g. as origin. D. K. M.

Co-ordination of theories of gravity separation. A. A. HIRST (Trans. Inst. Min. Eng., 1937, 94, 93—110).—The application of the laws of fluid resistance to problems of processes of gravity separation is discussed, and a new coeff. ϕ , which affords a convenient basis for comparing phenomena involving fluid resistance, is introduced. An account is given of the phenomena occurring in free settling, hindered settling, and interlocking beds of particles. The results of experiments to determine the effective d of suspensions of closely-sized sand, in H_2O , with respect to particles of varying sizes are discussed. H. C. M.

Separation by frothing. F. K. T. VAN ITERSOM (Chem. Weekblad, 1937, 34, 633—641).—The mathematical and physical theory and the practical application of separation by flotation and frothing are reviewed. Collectors, frothers, activators, depressants, sulphidisers, promoters, conserving agents, pH regulators, and dispersing agents are discussed. The flotation installation for separating coal at the State Mines in Limburg is also described. S. C.

Molecular distillation—useful vacuity. D. H. KILLEFFER (Ind. Eng. Chem., 1937, 29, 966—968).—A short account is given of the development of the art of distillation at extremely low abs. pressures, under which conditions the mean free path of an individual mol. may be some cm. in length. F. J. B.

Molecular distillation—apparatus and methods. K. C. D. HICKMAN (Ind. Eng. Chem., 1937, 29, 968—975).—The still described consists essentially of a heated, vertical cylindrical surface down which the preheated liquid trickles, and is surrounded by a concentric condensing surface. The narrow annular space between them is evacuated to the requisite degree by suitable pumps and arrangements are made to collect the distillate in stages. The necessary reservoirs and a pump are provided so that the bulk of the liquid may be recirculated, thus minimising the time during which it need be held at a temp. at which decomp. may take place. Since in such a still no boiling takes place, the course of the distillation must be followed by the plotting of an elimination curve, or, where this has been determined, by addition of a coloured "pilot" known to have similar elimination characteristics. The process has been employed to separate vitamins from cod-liver oil, and the early

work appears to show that the antirachitic material consists of three distinct fractions. F. J. B.

Molecular distillation—theory of elimination curve. N. D. EMBREE (Ind. Eng. Chem., 1937, 29, 975—979).—A mathematical analysis of the elimination curves and the effects of various modifications of the conditions on their shapes. F. J. B.

Efficiency and capacity of a bubble-plate fractionating column. C. C. PEAVY and E. M. BAKER (Ind. Eng. Chem., 1937, 29, 1056—1064).—An experimental fractionating column was arranged so that the three plates could be spaced 6, 12, or 18 in. apart. The amount of entrainment was arrived at by adding a solution of a dye at a known rate to the inlet to the middle plate and estimating the distribution by examining samples colorimetrically. It was shown that the plate-efficiency figures are generally a function of the entrainment figures. F. J. B.

Automatic functioning of distillation and rectification columns. G. GRIMAUD (Bull. Assoc. Chim. Sucr., 1937, 54, 506—516).—The automatic regulation of continuously-acting columns can be effected by two regulators, one controlling the steam supply (the pressure of which must also be regulated) and the other the EtOH discharge (coulage). These are best actuated in accordance with the temp. on the plates rather than with the pressure in the column. The temp. of certain intermediate plates is very sensitive to changes in working conditions, and thermometers installed on these plates can actuate the automatic regulators mentioned above. The system indicated is in use in 30 French distilleries. J. H. L.

Condensation of vapours on a horizontal tube. E. M. BAKER and A. C. MUELLER (Ind. Eng. Chem., 1937, 29, 1065—1067).—By installing six thermocouples in the wall of a Cu tube in such a way as to enable the whole assembly to be rotated while in operation it was possible to explore the temp. variation around the perimeter of the tube during the condensation of vapours on the outer surface. In general, the temp. is highest when the thermocouple is at the top of the tube and lowest at the bottom, and the variation is considerable. It is pointed out that any determination of heat-transfer coeff. in which this factor is not considered will be of doubtful val. F. J. B.

Irrigated packed towers. I—VII. S. UCHIDA and S. FUJITA (J. Soc. Chem. Ind. Japan, 1936, 39, 432—434B, 434—437B, 437—438B, 438—440B, 440—441B; 1937, 40, 238—240B, 240—244B).—I. An empirical formula resembling that for packed towers without irrigation (cf. B., 1935, 177), but with addition of an undetermined factor $\phi(V_w)$ for the influence of the wet void (V_w), is proposed for the pressure drop in towers packed with Raschig rings and irrigated with H₂O. The apparatus is described.

II. $\phi(V_w)$ is found to be of the form e^{-aV_w} , where a is a const. The pressure drop is substantially independent of tower diameter if the ratio of tower diameter to packing diameter (d) is >7 .

III. The point of flooding is correlated with air velocity, rate of irrigation, d , V_w , and dry void.

IV. The distribution of H₂O in packed towers is studied.

V. The pressure drop has been studied with stacked packing of the rings. The pressure drop is very much $<$ that for dumped packing for given vals. of Reynolds no., (mean gas velocity based on empty tower)²/2gd, and V_w . There is no danger of flooding at considerable vals. of air and H₂O velocity.

VI. The pressure drop has been studied with both dumped and stacked packing, using irrigation flows of 30—250 m.³/m.²/hr. Empirical equations and charts are given.

VII. Packing of broken stone has been studied. The dry and wet voids are $<$ those of Raschig rings. Data for flooding points are plotted, using the ratios of the mean gas velocity (based on the empty tower) to the mean H₂O velocity (empty tower); the wet void/dry void % as co-ordinates all lie on the same curve irrespective of packing. As with Raschig rings, the controlling factor affecting the distribution of H₂O is the relation of the inside diameter of the tower to the diameter of the packing. R. S. B.

Laminar motion in cylindrical tubes of viscous fluids with variable viscosity. Theory. G. BOZZA (Chim. e l'Ind., 1937, 19, 564—568).—Theoretical. O. J. W.

Law of motion of particles in a fluid. R. T. HANCOCK (Trans. Inst. Min. Eng., 1937, 94, 114—118).—From a crit. analysis of data obtained previously by Hirst (cf. *ibid.*, 1932, 85, 236), two formulæ have been developed which express the behaviour of particles under various conditions of packing, and also cover the special case of free settling. H. C. M.

Problem of practical gloss measurements. H. WOLFF and G. ZEIDLER (Paint Var. Prod. Man., 1937, 17, No. 4, 7—13).—Experiments with photographic papers (providing black, grey, and white surfaces of various degrees of gloss) indicate that there is a close correlation between subjective gloss and the difference between the specular and diffuse reflectivities. The correlation persists, but is less close, in the case of coloured papers, whilst anomalous results are obtained in the case of metallic foils. D. R. D.

Gas analysis apparatus. Filters for lubricants. Lubrication of bearings.—See II. **Dissolving cellulose derivatives.**—See V. **Utilising Cu rocks etc.**—See VII. **Dryer for clayware.**—See VIII. **Wood for plant construction.**—See IX. **Bearing metal for power stations.**—See X. **Matt paints for machinery.**—See XIII. **Distilling H₂O—EtOH mixtures.**—See XVIII.

See also A., I, 636, **Packed fractionating columns.**

PATENTS.

Heating process. K. M. SIMPSON, Assr. to INTERNAT. CHROMIUM PROCESS CORP. (U.S.P. 2,057,065, 13.10.36. Appl., 1.7.35).—In a reverberatory furnace air is passed horizontally through and fuel downwards through the roof in a no. of high-pressure burners, combustion taking place mainly while impinging on the charge. B. M. V.

[Multi-hearth] furnace. G. R. LEWERS, Assr. to DECARIE INCINERATOR CORP. (U.S.P. 2,061,708, 24.11.36. Appl., 24.12.34).—A multi-hearth roaster for revivifying oil-soaked fuller's earth or the like has the upper hearths muffled from combustion chambers beneath them, and those hearths are utilised for distilling off oil without permitting combustion of the evolved vapours. B. M. V.

Melting furnaces. P. HILLEBRAND (B.P. 473,111, 2.11.36. Ger., 30.1.36).—A reverberatory furnace for both gas and oil firing is described, the oil flames being nearest the charge. B. M. V.

Heat-treating furnace. W. E. KINGSTON, Assr. to HYGRADE SYLVANIA CORP. (U.S.P. 2,061,910, 24.11.36. Appl., 7.8.35).—Small articles are annealed on a conveyor passing through H_2 which is supplied to a heated chamber at the highest point between sloping inlet and outlet chambers, the latter being also provided with curtains to prevent the formation of explosive mixtures. B. M. V.

Apparatus for annealing. A. W. HERMAN, Assr. to L. WILSON (U.S.P. 2,058,450, 27.10.36. Appl., 15.3.35).—In a close-annealing furnace having a thin inner bell, means operating from outside the furnace for preventing the side walls of that bell from buckling are provided. B. M. V.

Rotary kilns. M. VOGEL-JØRGENSEN (B.P. 473,553, 14.4.36. Addn. to B.P. 437,512; B., 1936, 473).—The upper end is formed as a helical channel across which chains are stretched. [Stat. ref.] B. M. V.

Rotary kiln. G. F. HORTON (U.S.P. 2,057,526, 13.10.36. Appl., 24.6.35).—An apparatus for calcining oyster shells (*e.g.*) comprises a cylindro-conical shell provided with an inlet for hot gases axially at one end, preferably the more obtuse of the two, and with an outlet extending inwards some distance from the other end. The solids are charged and discharged through a manhole door. B. M. V.

Rotary kiln. R. C. NEWHOUSE, Assr. to ALLIS-CHALMERS MANUFG. CO. (U.S.P. 2,059,176, 27.10.36. Appl., 20.8.34).—A no. of light chains are arranged so that they lie closely on the bottom arc of the kiln or hang in the upper part only of the gas space, and a no. of heavier, longer chains are arranged to hang right across the gas space. B. M. V.

Drying [oven]. H. SUHR, Assr. to ACME SHEET METAL WORKS (U.S.P. 2,061,259, 17.11.36. Appl., 9.10.31).—A drying oven with a fan and means for recirculating vapour-laden air during the drying process, but affording rapid exhaustion of the foul air when the door is opened, is described. B. M. V.

Drying of substances in the condition of sludge and evaporating solutions. METALLGES. A.-G. (B.P. 472,437, 14.7.36. Ger., 21.8.35).—Drying is effected on a permeable conveyor by gas drawn through it. If the feed is too fluid, predried material is mixed in. Combinations of mixer, main dryer, and finishing dryer, with various return routes, are claimed. B. M. V.

Drying of cement slurry or other quasi-liquid material. J. S. FASTING (B.P. 471,915, 12.3.36).—

Drying is effected in two stages (*A*, *B*): in *B* the material is indirectly heated by the hot exhaust kiln gases and the steam evolved is utilised to partly heat *A*; the slurry in *A* is also in contact with the finally exhausting kiln gases. *B* is effected in a device in the mouth of the kiln, and *A* in a conveyor apparatus, the steam being in contact with metal plates forming the bed of a scraper-conveyor. B. M. V.

Drying of organic substances. A. E. WIGELSWORTH (U.S.P. 2,060,389, 10.11.36. Appl., 7.10.35).—In the drying of food or tobacco a continuous circulation of drying medium is maintained; on leaving the goods chamber part is chilled to condense out H_2O and the dry, cold medium is remixed with the bulk with turbulence, the whole being reheated prior to re-entering the goods chamber. B. M. V.

Centrifugal dryer. C. M. WILDERMAN (U.S.P. 2,057,755, 20.10.36. Appl., 18.9.34).—Peas, grain, or the like are guided downwards through the basket by a spiral driven at a different speed, and are discharged at the bottom into a fixed spiral chamber ending in a tangential outlet, above a similar chamber and outlet for H_2O . B. M. V.

Method of conducting reactions at high temperatures. RUHRCHEMIE A.-G. (B.P. 472,480, 20.3.36. Ger., 11.4.35. Addn. to B.P. 468,729; B., 1937, 1011).—Conversion of C_6H_6 and other hydrocarbons into C_2H_4 , CH_4 into C_6H_6 , or production of CH_2O from CH_4 and O_2 , is effected in the apparatus described in B.P. 468,729 (*loc. cit.*) by the process described in B.P. 461,366 (B., 1937, 411) but at \ll atm. pressure. B. M. V.

Carrying out chemical reactions and extraction processes. W. W. GROVES (B.P. 472,756, 23.3.36. Ger., 21.3.35. Addn. to B.P. 457,552; B., 1937, 301).—Two liquids, or the liquid component of a mixture of liquid and gas, are/is vibrated as described in the prior patent. Conveniently, the vibrations are transmitted through a flexible membrane in the wall of the vessel. B. M. V.

Carrying out exothermic reactions. DISTILLERS CO., LTD., H. LANGWELL, C. B. MADDOCKS, and J. F. SHORT (B.P. 472,629, 24.1.36. Addn. to B.P. 466,416; B., 1937, 757).—One or more of the following factors may be graduated during the flow: surface area, thickness or activity of the catalyst, velocity or turbulence of gas flow, cross-section of passage. B. M. V.

Control of chemical reactions. HOUDRY PROCESS CORP., Assees. of E. J. HOUDRY (B.P. 471,930, 13.3.36. U.S., 23.3.35. Addn. to B.P. 449,050; B., 1936, 816).—An apparatus containing a deep catalyst bed for exothermic (usually) or endothermic reactions is operated substantially as described in B.P. 449,050 (*loc. cit.*). Deep and forked heat-conducting fins are provided on the outlet and sometimes on the inlet conduits. B. M. V.

Control of catalytic converters. HOUDRY PROCESS CORP., Assees. of E. J. HOUDRY and T. B. PRICKETT (B.P. 471,931, 13.3.36. U.S., 4.6.35. Addn. to B.P. 449,050; B., 1936, 816).—Schemes for operating a catalyst alternately with endothermic and exothermic reactions are described. Claim is made

for feeding of hydrocarbons for endothermic reaction at 410—495° and afterwards for feeding O₂-containing fluid at 400—455°, heating of the latter being effected in two stages. B. M. V.

Recuperator structure. P. L. GEER, Assr. to AMCO, INC. (U.S.P. 2,061,376, 17.11.36. Appl., 12.6.31).—A recuperator for gases from glass furnaces or other gases containing slaggy material is formed with the gas passages vertical and those for air horizontal. B. M. V.

Heat-exchange apparatus adapted for heating by waste gases. CLARKSON THIMBLE TUBE BOILER Co., LTD., and H. J. FOUNTAIN (B.P. 473,412, 13.4.37).—A vertical, multitubular, water-tube boiler is provided with a tangential inlet for the heating gases and vertically elongated outlets into an axial stack pipe situated among the tubes. B. M. V.

Heat exchangers or condensers for oil-refining apparatus. C. H. LEACH (B.P. 472,822, 27.3.36. U.S., 2.3.36).—At the top of a tower the passage for oil vapours around the cooling tubes of a condenser converges as the vol. of vapour becomes less. B. M. V.

Hinges for laminated heat interchangers. E. PRESTAGE (B.P. 472,695, 2.4.36).—The plates of a pasteuriser or the like are mounted on slightly flexible hinges, like the leaves of a book, for ready cleaning. B. M. V.

Antifreeze liquids for heat exchangers and the like. E. I. DU PONT DE NEMOURS & Co. (B.P. 473,292, 8.4.36. U.S., 11.4.35).—H₂O or an aq. solution of a non-electrolyte which depresses the f.p. is rendered non-corrosive to Cu, Fe, Sn, Al, and the like by addition of 0.03% of a nitrite of a metal above Al in the electromotive series, and a still smaller proportion of an org. S compound. A large no. of suitable compounds are specified. B. M. V.

Pasteuriser. A. C. HOUGHLAND, Assr. to CRANE Co. OF MINNESOTA (U.S.P. 2,057,895, 20.10.36. Appl., 6.6.35).—A long horizontal vat or trough is jacketed with heating and cooling media in suitable zones and outside these with heat insulation. Agitation is effected only by stirrers depending through the lid, having no submerged bearings. B. M. V.

Sterilising apparatus. A. U. ALCOCK (B.P. 473,338, 7.4.36).—Automatic means for creating a vac., admitting a heated org. substance, and re-admitting air are described. B. M. V.

Apparatus for sterilising aqueous liquids. G. H. MEINZER, Assr. to CALIFORNIA CONSUMERS CORP. (U.S.P. 2,061,323, 17.11.36. Appl., 30.7.34).—Sterilisation of H₂O etc. is effected by contact with Au, Ag, or Cu, the conduit walls, baffles, and foraminous blades of a propeller being made of the metal selected. B. M. V.

Constant-pressure apparatus. W. F. MESINGER, Assr. to UNION CARBIDE & CARBON CORP. (U.S.P. 2,058,385, 20.10.36. Appl., 30.12.32).—A diaphragm subject to pressure controls a valve by its deflexion and is itself controlled by a spring. Two methods of making the spring pressure independent of the deflexion are described. B. M. V.

Thermostatic apparatus. L. PAILLART, and ETABL. M. HOUDAILLE (B.P. 471,960, 19.1.37).—The expansion of a metal-capped rubber rod is utilised to decrease the aperture, through which a viscous liquid is forced, in proportion to the reduction of η with temp. B. M. V.

Thermostatic or thermometric devices and temperature control thereby. J. STONE & Co., LTD., and J. F. B. VIDAL (B.P. 473,298, 9.4.36).—A temp.-sensitive material, e.g., a volatile liquid, is contained in a ring-shaped vessel which is adapted to swing to a greater or less extent through a partition which may divide a room or ventilating duct from the external atm. so that a compound effect is produced. B. M. V.

Devices for automatic control of temperature and other variable conditions. W. BOWEN (B.P. 473,594, 10.3.36).—The pointer of an indicating instrument deflects a beam of light into one or other of a pair of photosensitive cells when it slightly leaves the desired position. The light beam is conc. by a condenser and the pointer prevented from moving right out of the beam by a stop. B. M. V.

Thermocouple and method of mounting same. A. H. HEYROTH and E. W. BRATTON, Assrs. to GLOBAR CORP. (U.S.P. 2,061,357, 17.11.36. Appl., 27.12.33).—The couple comprises SiC and Si, the former being a rod bonded by recrystallisation and coated with insulating refractory material except at the ends. B. M. V.

Pyrometers. BRIT. THOMSON-HOUSTON Co., LTD. (B.P. 472,146, 13.1.37. U.S., 14.1.36).—From the energy radiated by the hot body two different λ are selected by a prism and rotating slit and allowed to fall alternately into the same responsive apparatus. The greater energy of the two is reduced by screening until both are equal, thus forming a radiation pyrometer unaffected by smoke, for the reading depends on spectral distribution only. B. M. V.

Cooling towers or structures for cooling water or other liquids. F. E. GILL, and DAVENPORT ENG. Co., LTD. (B.P. 472,425, 2.5.36).—Arrangements of drip laths on edge in notched bearer boards are described. B. M. V.

Refrigerating medium. B. E. TIFFANY, Assr. to KELVINATOR CORP. (U.S.P. 2,058,924, 27.10.36. Appl., 28.9.34).—A hold-over "brine" or cold accumulator comprises 17—25 wt.-% of PrOH in H₂O with 0.1—0.2% of alkali chromate to prevent corrosion. B. M. V.

(A) Softening of, (B) removal of fluorine from, water. H. V. CHURCHILL (U.S.P. 2,059,552—3, 3.11.36. Appl., 2.10.33).—(A) The hardness-forming material is adsorbed on Al₂O₃ which has been activated at 300—800° (400—500°) and regenerated with dil. HCl, the H₂O being alkaline to Me-red. (B) F is adsorbed in the same reagent if the H₂O contains alkali-metal ions to an extent giving p_H 4—8. B. M. V.

Separation of impurities from the working medium in water-tube steam generators. SULZER FRÈRES SOC. ANON. (B.P. 472,423, 28.4.36. Switz.,

12.10.35).—In a boiler of the once-through type, two deflexion or other-type separators are placed at different points in the tube system, the first at a point where about 10% of liquid is left and the second after superheating has commenced. B. M. V.

Production of polar absorbents [for water softening]. E. B. HIGGINS (B.P. 473,647, 14.4.36).—Polar absorbents for use in the base-exchange purification of H_2O are obtained by treating coal, lignite, or anthracite with three times its wt. of conc. H_2SO_4 at $>60^\circ$ for 8–12 hr. The activity of the products can be further increased by a subsequent treatment with 0.5N- $Ca(HCO_3)_2$, $-NaHCO_3$, or $-KHCO_3$.

H. C. M.

Cleaning of feed-water heaters. F. H. GRAHAM and V. D. WASHBURN (U.S.P. 2,057,189, 13.10.36. Appl., 14.4.32).—Carbonised and gummy oil is removed by a mixture of paraffin and coal oils of specified η and flash point. B. M. V.

Treatment of working medium fed to steam generators or hot-water generators. SULZER FRÈRES SOC. ANON. (B.P. 473,605, 15.4.36. Switz., 16.5.35).—The feed- H_2O being alkaline, crude $NaHSO_3$ is introduced into either the feed- H_2O pipe or the boiler itself. B. M. V.

Water-heating and -distilling apparatus. K. COOKSON (B.P. 472,655, 27.3.36).—An apparatus in which the excess cooling- H_2O of the still is utilised as domestic hot H_2O is described. B. M. V.

Hammer mill. C. F. CRUMB and M. W. ROSCOE, ASSRS. to INTERNAT. HARVESTER CO. (U.S.P. 2,059,316, 3.11.36. Appl., 25.6.34).—A feeding device includes means to cut up roughage and a governor to reduce the feed on overload. B. M. V.

Grinding mill. R. D. MACDONALD, ASSR. to INTERNAT. HARVESTER CO. (U.S.P. 2,059,377, 3.11.36. Appl., 13.4.34).—In a hammer mill for stock feed, a flap is provided in the feed shoot to prevent exit of material when the hopper is empty, and the throat of the shoot is provided with a shear bar to cut cobs, in conjunction with a knife on the rotor. B. M. V.

Gyratory crushing machines. HADFIELDS, LTD., and P. B. BROWN (B.P. 473,019, 4.1.36).—The crushing head is supported in the vertical direction by a wobble shaft adjustable by stationary means at the bottom. General lubricating means are described. B. M. V.

Grinding mills. N. S. BORCH (B.P. 471,929, 13.3. and 6.4.36).—A high-speed rotor creates a commotion in the material being ground, in absence of grinding bodies. Forms of rotor are described. B. M. V.

Grinding mill. J. H. JOHNS (U.S.P. 2,059,795, 3.11.36. Appl., 23.10.35).—The apparatus comprises a loosely suspended but non-rotating upper disc and a rotating lower disc with walls (forming a cup) which extend above the upper surface of the upper disc. Both grinding surfaces are provided with serrated wear plates and the space is filled with balls or the like. The material is fed on the top of the upper disc and the coarser part works down into the grinding space only through suitable apertures against a rising

stream of H_2O , which overflows the finer material. The H_2O feed is through a hollow shaft. B. M. V.

Grinding machine. F. P. HESS, ASSR. to ENTERPRISE MANUFG. CO. OF PENNSYLVANIA (U.S.P. 2,059,106, 27.10.36. Appl., 6.2.36).—A disc grinder for coffee or the like is provided with an automatic switch which stops the motor when the discs approach too close owing to absence of material. B. M. V.

Grinding and like apparatus. G. H. SCHIEFERSTEIN (B.P. 472,719, 27.8.36. Ger., 16.6.36).—A vessel containing the material and grinding media is supported by resilient means inside another vessel, and both are subjected to relative oscillation and, if desired, rotation. Balancing of the driving power is provided for. B. M. V.

Sifting, grading, or screening apparatus. PASCALL ENG. CO., LTD., and W. C. BRAINT (B.P. 472,641, 26.3.36).—The screen and receiver are supported centrally by a vertical shaft which is vibrated vertically by a cam and is also tilted by a ring which has an inclined upper surface and is rotated, preferably by a pawl, to produce slow gyration of the screen. B. M. V.

Sifting device. E. SCHNEIDER and K. BLUM, ASSRS. to BÜTTNER-WERKE A.-G. (U.S.P. 2,059,814, 3.11.36. Appl., 23.2.35. Ger., 23.2.34).—Dusty gases, *e.g.*, those from a pneumatic dryer, are caused to pass vertically at high speed into a return bend, the heavier particles following the outer wall and being skimmed off by an impact plate extending through that wall in the downcast conduit; lighter dust is separated in a gravity chamber the entry to which is horizontal, and to which an adjustable by-pass is provided. B. M. V.

(A) **Separating apparatus.** (B) **Straining or separating equipment.** D. R. MCNEAL, ASSR. to ANDALE CO. (U.S.P. 2,057,497—8, 13.10.36. Appl., [A] 20.2.33, [B] 26.9.34).—(A) A rotary strainer with pockets for dirt is cleaned sector by sector by reverse flow. (B) The strainer is formed of spirally-wound corrugated and plain strips divided into sectors by moulded material along the radii and circumference. B. M. V.

Separating machine and process. K. DAVIS, ASSR. to S. W. BLAKSLEE (U.S.P. 2,062,211, 24.11.36. Appl., 4.1.34).—An apparatus for the dry separation of coal and rock (*e.g.*) comprises inclined shaking pans having a peculiar motion. B. M. V.

Classification of material by elutriation. L. ANDREWS (B.P. 472,258, 18.3.36).—Fine material and H_2O are withdrawn by a siphon pipe from a large annular chamber above the inlet chamber. The inlets of feed are tangential and the middle and coarse sizes are washed by a jet of clear H_2O causing a vortical motion, the middling being lifted up a central uptake by a propeller. B. M. V.

Sedimentation tanks or reservoirs. W. G. FARRER and C. DAVIS (B.P. 472,180, 1.4.36).—A tank is provided with a central overflow for clear liquid. The inlet and sludge outlets are both annular at the max. diameter, the latter being provided with collecting hoppers and pipes at intervals so that the

heavy sand drops at once into the outlet channel with min. wear on the rakes.

B. M. V.

Material mixer. J. A. ERICKSON (U.S.P. 2,059,857, 3.11.36. Appl., 20.8.23).—A vessel is provided with a bottom in the form of twin troughs in which paddles are rotating.

B. M. V.

Mixing apparatus. P. REICHERT (B.P. 473,652, 14.4.36. Ger., 10.4.35).—Intimate mixing of liquids or liquid and suspended solid or gas is effected by a worm having a small clearance (0.001—1.0 mm.) between the edge of the worm and the tubular casing; the latter being closed at the delivery end.

B. M. V.

Apparatus for producing vitreous or metallic surfaces. G. DUCCINI and P. R. CAREDDIO (U.S.P. 2,058,218, 20.10.36. Appl., 17.4.34).—A spray gun for pulverised material is described. In an attached or adjacent container the powder is kept in agitation by part of the air, and heating may be applied.

B. M. V.

Apparatus for treatment of materials with liquid and gaseous preparations. F. GAMERDINGER and O. WEBER (B.P. 471,996, 28.5.36).—An automatic timed device for dipping a basket or rack containing or supporting articles into a bath of liquid is described.

B. M. V.

Solvent extraction of solids [e.g., alumina] by continuous digestion. M. P. WEIGEL, Assr. to ALUMNUM CO. OF AMERICA (U.S.P. 2,056,993, 13.10.36. Appl., 3.9.31).—In, e.g., the prep. of Al_2O_3 from bauxite, the charge is delivered into a mixing tank and pumped to a surge tank, whence it passes through several heating tanks in series at rising temp. and increasing pressure, then into a holding tank and through a reducing valve, into several cooling tanks at falling temp. and decreasing pressure. The holding tanks are heated as far as possible by steam evolved from the cooling tanks. The separation of pure Al_2O_3 is not part of the invention.

B. M. V.

[Centrifugal] dehydration apparatus. L. ALTPETER (U.S.P. 2,059,191, 3.11.36. Appl., 30.11.34. Ger., 2.12.33).—In a centrifuge the material is distributed evenly by a device that reciprocates axially, and drainage is effected by hollow bodies extending inwards from the wall of the bowl, these being imperforate on the side on which the material tends to pile and perforated on the opposite side.

B. M. V.

Multistage centrifugal separation. C. G. HAWLEY, Assr. to CENTRIFIX CORP. (U.S.P. 2,059,521, 3.11.36. Appl., 13.6.32. Renewed 30.3.36).—In a cyclone separator, especially for vapour and liquid, the issuing vapour is again put in rotation in an axial compartment leading to the outlet.

B. M. V.

[Centrifugal] separating apparatus. C. MACCALLUM (U.S.P. 2,058,026, 20.10.36. Appl., 24.12.32).—The rotor of a centrifuge for sewage or the like is formed of a no. of superposed rings which during charging are clamped together to form an impervious bowl, and the liquid is discharged through ports which are gradually moved closer to the axis by a device described. When the bowl is full of sludge the rings are opened slightly so that the bowl becomes a strain-

ing basket and the solid matter is dried with but little loss. Finally the rings are opened wide to discharge the sludge.

B. M. V.

Method of introducing rubber latex and similar liquids to be separated into a centrifugal separator. AKTIEB. SEPARATOR (B.P. 473,261, 24.6.37).—The feed is admitted so as directly to hit, or to merge with at as nearly as possible an equal velocity, a layer of latex already under rotation, thus preventing coagulation in undesired places.

B. M. V.

Tiltable collecting vessels for centrifugal separators. AKTIEB. SEPARATOR, Assees. of BERGEDORFER EISENWERK A.-G. ASTRA-WERKE (B.P. 472,882, 15.4.37. Ger., 22.4.36).—In a hinged cover separate passages are provided for feed and an overflow (preferably excess feed). The former is supplied through the hinge and the latter exhausts into a fixed outlet.

B. M. V.

Liquid-discharge device for centrifugal separators. H. O. LINDGREN, Assr. to DE LAVAL SEPARATOR Co. (U.S.P. 2,059,372, 3.11.36. Appl., 7.6.35. Swed., 1.9.34).—Skim milk (or heavier liquid) is discharged by a stationary skimming device entirely preventing admixture with the cream.

B. M. V.

Centrifuge construction. A. PELTZER, Assr. to MERCO CENTRIFUGAL SEPARATOR Co., LTD. (U.S.P. 2,060,239, 10.11.36. Appl., 2.7.34).—Nozzles for discharge of heavier constituent are described; the final outlet points backwards of the rotation.

B. M. V.

Holder for centrifugal bowls. AKTIEB. SEPARATOR, Assees. of BERGEDORFER EISENWERK A.-G. ASTRA-WERKE (B.P. 472,751, 6.5.37. Ger., 14.5.36).—A device for use when unscrewing the shaft nut is described.

B. M. V.

Classifiers. DORR Co., INC. (B.P. 472,424, 30.4.36. U.S., 1.5.35).—Raking means for a combined bowl-and-sloping-bed type of classifier are described.

B. M. V.

Apparatus for de-aërating liquids. G. N. PULLEY, Ded. to U.S.A. (U.S.P. 2,060,242, 10.11.36. Appl., 11.7.36).—The liquid is centrifugally sprayed into a vac.

B. M. V.

[Drum] filter. W. RAISCH, Assr. to MUNICIPAL SANITARY SERVICE CORP. (U.S.P. 2,060,896, 17.11.36. Appl., 26.3.36).—Cake is stripped from a drum filter by the brushing action of a conveyor having projections, and is guided thereto by a roller above the take-up end of the conveyor.

B. M. V.

Rotary drum filter. I. SABLİK (U.S.P. 2,061,257, 17.11.36. Appl., 17.3.34. Czechoslov. and Ger., 20.3.33).—A filter drum is enclosed in a casing for operation by pressure, and the filter cloth is non-adherent, a loop of it being brought out from and returned to the drum through slits in the casing.

B. M. V.

Removal of filter cake from rotary filters. J. WIEBE (B.P. 472,462, 20.12.35).—In apparatus generally as described in B.P. 470,965 (B., 1937, 1289) the stripping roller is impervious and is formed with depressions which may be undercut or formed of wire mesh to increase the adherence of the permanent

layer. The counter-roller is fixed at a suitable distance, is provided with saw-like teeth, and removes excess of cake. Both rollers are driven and should be of different diameters. B. M. V.

Filters. LE BOZEC & GAUTIER (B.P. 473,224, 1.1.37. Fr., 6.1.36).—A no. of cylindrical filter walls are clamped between headers which are perforated in such a way that alternate annular spaces are for prefilter and filtrate; some of the filter surfaces are held in reserve by a cut-off valve in a header. B. M. V.

Filter leaf. H. W. DENHARD, Assr. to OLIVER UNITED FILTERS, INC. (U.S.P. 2,061,351, 17.11.36. Appl., 4.1.35).—The leaf is provided with a frame of U-section, forming the filtrate drainage, and with suitable surrounding gaskets. B. M. V.

Filters. E. W. W. KEENE (B.P. 472,540, 24.2.36).—Means for securing leaves to a hollow shaft of an enclosed pressure-filter are claimed. B. M. V.

Filters. H. LADERER (B.P. 473,264, 3.1.36. Ger., 14.9.35).—A filter for oil or the like is composed of helically wound wire or straight bars having sharp edges on one side, spaced by means of protuberances and provided with a comb-like cleaner which may be driven by the flow of oil. B. M. V.

Filter tube. A. J. BARRETT (U.S.P. 2,057,814, 20.10.36. Appl., 15.12.34).—Filter tubes for suspending in prefilter are composed of a core of cypress or like wood preferably with a hollow core, and grooved arcuate sections nailed to the wooden core by nails at the bottom of the grooves, the assembly forming a fluted drum; filter cloth is stretched over the ridges and a protecting wire wound on. B. M. V.

Cleaning of [bed-]filters. F. P. CANDY (B.P. 473,480, 13.3.36. Addn. to B.P. 437,275; B., 1936, 49).—The air inlets are cleared of sand by a preliminary H₂O-flush, exhausting through the ends of the pipes to a special channel. B. M. V.

Production of a filtering element. E. ROBERTS, Assr. to WESTERN STATES MACHINE Co. (U.S.P. 2,061,850, 24.11.36. Appl., 29.1.34).—A fine screen for use in centrifugals etc. is backed by stiff, coarsely perforated sheet which is tinned and united to the fine mesh by pressure at above soldering temp., the solder penetrating the fine gauze. B. M. V.

Filtermasse washer. J. A. RHEINSTROM, Assr. to KARL KIEFER MACHINE Co. (U.S.P. 2,061,089, 17.11.36. Appl., 26.10.34).—The filter medium is removed from the filter to a separate apparatus for washing, the latter comprising a tank with vertical screens in the upper part of the walls for removing dirty H₂O and retaining the filtermasse, which flows out continuously in the clean state through the conical bottom. B. M. V.

Clarification of liquids. R. D. and M. J. ELLIOTT (U.S.P. 2,057,887, 20.10.36. Appl., 15.10.32).—Clarification is effected by upflow through sand which is kept in slow downward motion by addition of sand at the top and removal of dirty sand from the bottom. By causing the turbid fluid to enter under an upright cone in the midst of the sand the initial

face of the sand is upwardly presented and constantly renewed. B. M. V.

Purification of liquids [especially gasoline]. SOC. ANON. POUR TOUS APPAREILLAGES MÉCANIQUES (B.P. 473,108, 19.10.38. Fr., 7.2.36).—A stream of liquid (e.g., petrol) to be separated from H₂O and air is subdivided into a no. of equal streams by concentric sleeves in the inlet pipe and is caused to flow radially outward, in laminar form, between closely spaced discs, the impurities dropping or rising out over the edge of the discs. B. M. V.

Gas and liquid separating apparatus. J. C. HOBBS (U.S.P. 2,058,240, 20.10.36. Appl., 9.12.32. Renewed 6.8.36).—A separator of the parallel, corrugated-plate type is placed in the steam drum of a boiler. B. M. V.

Gas separators for liquids to be metered. J. ZWICKY (B.P. 471,939, 26.6.36).—The whole of the liquid enters a vent chamber vertically upwards, reverses therein, and leaves downwards. The float which operates the venting valve is shielded from the drag of the liquid; its fall is cushioned by a pool of the liquid in a dish. B. M. V.

Apparatus for separating air and solids from liquids. T. J. KENNY, Assr. to SHEFFLER-GROSS Co., INC. (U.S.P. 2,061,517, 17.11.36. Appl., 23.7.35).—From a closed chamber the main outlet is through a disc filter at an intermediate level; a non-automatic sludge-and-float-operated gas vent are also provided. B. M. V.

Diffusion impeller deflector. L. D. DRAKE (Assee.) and W. M. GARDELLA (U.S.P. 2,061,564, 24.11.36. Appl., 29.8.34. Renewed 5.12.35).—An agitator comprises a hollow shaft and hub, and solid impeller blades so shaped as to produce cavitation, the apertures in the hub being positioned to feed a minor fluid into the cavities of the major liquid. The impeller may be placed in the throat of a Venturi-shaped baffle in the lower part of a flotation cell, cyanide agitator, or the like. B. V. M.

Fluid-segregating apparatus. D. SAMIRAN (U.S.P. 2,057,693, 20.10.36. Appl., 9.5.32).—In apparatus for separating two liquids by stratification the vol. of a float for controlling a discharge valve for the heavier liquid and for floating in both liquids is manually adjustable to suit the conditions. B. M. V.

Liquid and gas contacting apparatus. J. A. CAMPBELL (U.S.P. 2,061,830, 24.11.36. Appl., 5.8.35).—In a tower the bubblers are of the perforated-plate type, the perforations having loose, valve-like distributing devices in them. B. M. V.

Apparatus for treating liquids with gases. H. B. JESPERSEN, Assr. to HANSON-VAN WINKLE-MUNNING Co. (U.S.P. 2,057,100, 13.10.36. Appl., 26.6.35).—In the hydrogenisation of oils, liquid and gas are drawn from the bottom and top, respectively, of a closed container and pumped together in spray form back into the upper part. Catalyst, if used, is in suspension in the liquid. B. M. V.

Apparatus for extracting liquids from vapours, specially applicable to evaporators. D. A. QUIG-

GIN (B.P. 473,358, 10.3.36).—A separator having scroll-shaped passages is described. B. M. V.

Atomisers for drying [spray-evaporation] purposes. E. KIRSCHBAUM (B.P. 473,471, 7.4.37, Ger., 2.5.36).—The liquid is introduced perpendicularly from both sides into motive jets of air, the exit for air and spray being through sharp-edged orifices of substantially the same diameter as that of the air jets. Instead of having a large no. of separate jets, a single annular air jet with liquid supply inside and outside may be provided. B. M. V.

Vacuum pans of forced-circulation type. CO-OPERATIVE WHOLESALE SOC., LTD., and B. HIBBETT (B.P. 472,235, 18.3.30).—Baffles over the ends of calandria tubes are described. B. M. V.

Shell and tube evaporator. W. H. CARRIER, Assr. to CARRIER ENG. CORP. (U.S.P. 2,059,725, 3.11.36, Appl., 9.3.34).—An apparatus comprising a nest of horizontal tubes in a shell and utilised for evaporating refrigerant outside the tubes and chilling brine or the like inside is provided with a system of hoods baffling the vapour on its way to the outlet, in order to utilise the tube surface more uniformly and prevent entrainment. B. M. V.

Bubble tray and method of assembly. W. F. SELIG and R. C. WHEELER, Assrs. to STANDARD OIL CO. (U.S.P. 2,059,044, 27.10.36, Appl., 3.10.32).—The trays are divided into sections and secured by wedges around the periphery. B. M. V.

Bubble cap. T. O. WENTWORTH (U.S.P. 2,060,601, 10.11.36, Appl., 8.11.35).—Forms of serration on the rim of the cap are claimed. B. M. V.

Separating a liquid [solution] into its constituent parts. P. SCHUFFAN, E. KARWAT, and A. STEINBACH (U.S.P. 2,057,598, 13.10.36, Appl., 23.10.34, Ger., 1.11.33).—For separation by crystallisation of either the solvent or solute the whole is chilled to form a barely self-sustaining mass in tapering annular form, and is transferred to a centrifuge or other means of applying pressure, the separation being completed by washing with a gas at slightly higher temp. B. M. V.

Rectification [of vapours]. R. N. SHIRAS (U.S.P. 2,059,494, 3.11.36, Appl., 25.7.35).—For the definite separation of normally gaseous and normally liquid components, e.g., petrols, the vapours issuing from the top of a column are scrubbed in a side apparatus with cooled wash oil, the warm oil solution is admitted to the tower as reflux, and the wash oil solution from the bottom of the tower is stripped of gasoline in a separate still. B. M. V.

Apparatus for effecting the discharge of a volatile liquid. LINDE AIR PRODUCTS CO., Asses. of G. H. ZENNER (B.P. 472,471, 23.1.36, U.S., 24.1.35).—A metered cascade system for transfer from a cold low-pressure to a warmer high-pressure vessel is described. B. M. V.

Viscosimeter. H. T. BOOTH, Assr. to LUBRICATION CONTROL CORP. (U.S.P. 2,056,952, 13.10.36, Appl., 7.2.33).—A flow of oil or the like at const. pressure, as determined by a spring-loaded valve, is

passed through a sharp-edged orifice and a capillary tube (in either order) and the intermediate pressure recorded. B. M. V.

Air filter [panel]. L. L. DOLLINGER, Assr. to STAYNEW FILTER CORP. (U.S.P. 2,058,669, 27.10.36, Appl., 13.3.35).—A frame and cross-bars for supporting pleated filtering material is described. B. M. V.

Filter for removing solids from gases. R. B. RATHBUN, Assr. to AMER. SMELTING & REFINING CO. (U.S.P. 2,057,446, 13.10.36, Appl., 16.11.33).—A bag filter operating by outward flow is provided with a rotary suction cleaner having an elongated nozzle extending substantially the full length of the bag; diametrically opposite to it an arm and shoe maintain the position of the cylindrical bag and, in conjunction with the internal pressure of simultaneous filtering, maintain a strip of the bag in contact with the nozzle. B. M. V.

Dust collector. E. A. KLEISSLER, Assr. to G. A. KLEISSLER CO. (U.S.P. 2,057,578, 13.10.36, Appl., 1.8.35).—The dirty air passes first into the dust-collecting hopper, and then upwards into and outwards through filter bags provided with shaking means. B. M. V.

Dust separators for gases. BUELL COMBUSTION CO., LTD. From H. VAN TONGEREN (B.P. 472,729, 12.11.36).—Gas is deflected backwards by dry vanes while flowing at >12 m./sec., and next passes in a zigzag direction at <6 m./sec. through wet vanes. The dirt-laden H_2O is re-used on the countercurrent principle. B. M. V.

Dust separator and heat-exchange apparatus. H. H. BUBAR (U.S.P. 2,060,169, 10.11.36, Appl., 26.9.30).—The gases are deflected towards dust traps, the deflectors being hollow and carrying another fluid adapted to recover heat. B. M. V.

Extraction of dust or the like from air or gas. BERRISFORD ENG. CO., LTD., and R. H. ALLEN (B.P. 473,081, 24.4.36).—A conc. dust layer is skimmed off in a volute casing, cooled, and the dust separated by any suitable means. B. M. V.

Centrifugal means for extraction of grit from flowing gases. A. J. TER LINDEN (B.P. 473,484, 9.4.36, Holl., 12.4.35).—For a cyclone separator, without extra guiding elements, the relative dimensions are claimed. B. M. V.

Separator [for cleaning gas]. J. E. WATSON, Assr. to PRAT-DANIEL CORP. (U.S.P. 2,059,673, 3.11.36, Appl., 18.3.35).—The gas is caused to flow horizontally through passages which repeatedly converge and diverge, skimming devices being placed at the narrowest points; the skimmed dirty gas passes into the dead spaces between the walls. B. M. V.

Apparatus for cleansing or scrubbing gases. KOELA PRODUCER-GAS PLANT CO., LTD., and B. E. M. GOLDMAN (B.P. 473,195, 4.4.36).—The gas is caused to pass in a sinuous manner through masses of wood wool, wire wool, tow, or the like. B. M. V.

Separator. J. A. STUARD (U.S.P. 2,058,189, 20.10.36, Appl., 24.10.33).—Compressed air is filtered through pebbles and wool or the like and a

H₂O-discharge valve is opened only when there is a pressure drop across the filter, due to actual flow of air. B. M. V.

Separation of [flowing] fluids. J. P. WALKER, Assr. to G. O. MARCHANT and C. G. WELLS (U.S.P. 2,057,257, 13.10.36. Appl., 23.10.33).—A mixture of oil and gas (*e.g.*) is injected tangentially to form a thin sheet on the wall of a separating vessel, and means are incorporated to ensure proper spreading at reduced output. B. M. V.

Fluid-treating mechanism and method. W. S. BOWEN (U.S.P. 2,060,166, 10.11.36. Appl., 12.11.34).—One substance is introduced while in the form of a whirling spray into a rapidly flowing stream of the other, the mixture passing on vertically downwards. B. M. V.

Compression of gas. D. G. GRISWOLD, Assr. to CLAYTON MANUFG. CO. (U.S.P. 2,061,938, 24.11.36. Appl., 8.5.34).—In the pumping of beer or aerated waters, the liquid under pressure is admitted so as to fill completely a closed vessel and is partly drained away to draw in the total quantity of gas desired; the pressure liquid is then readmitted to the desired pressure. B. M. V.

Gas-absorption machine. H. E. LA BOUR (U.S.P. 2,058,326, 20.10.36. Appl., 27.5.35).—A body of gas is kept in rotation by a fan-like impeller and liquid is forced through tangentially in the opposite direction. B. M. V.

Apparatus for analysing exhaust gases. G. H. ALLEN, Assr. to ALLEN ELECTRIC & EQUIPMENT CO. (U.S.P. 2,059,428, 3.11.36. Appl., 11.4.34).—The apparatus includes a burette and absorption chamber, reservoirs for filling them, and suitable connexions and three-way cocks, the whole being mounted on a frame which tilts through 90°. B. M. V.

Production of reflecting surfaces. BAIRD TELEVISION, LTD., and J. L. BAIRD (B.P. 473,150, 9.4.36).—A mould, *e.g.*, of optically flat glass, is covered with a protective film which itself is coated with a mirror film which is cemented to the object on which the mirror is desired; the protective and mirror films and the object are then removed together from the mould. The protective film may also be of optically worked glass. B. M. V.

Stabilisation of friction elements. J. E. POLLAK. From AMER. BRAKEBLOK CORP. (B.P. 473,020, 26.2.36).—PbS and/or ZnS are/is utilised. B. M. V.

Treatment of brake drums. J. H. HUNT and A. P. SCHWEIZER, Assrs. to MOTOR WHEEL CORP. (U.S.P. 2,061,769, 24.11.36. Appl., 19.3.35).—The score-resisting drum, or lining strip welded to form a hoop, is formed of hypoeutectoidal steel containing 1–2% of Mn. It is heated to 843°, cooled in air to room temp., and may then be sized but not machined. B. M. V.

Viscous liquid for use in shock absorbers. G. L. MATHESON, Assr. to STANDARD OIL DEVELOPMENT CO. (U.S.P. 2,058,899, 27.10.36. Appl., 1.12.32).—A liquid of which η does not vary much with temp. comprises petroleum oil (similar to kerosene) and a

small proportion of an aliphatic chain-hydrocarbon polymeride of mol. wt. >800, the η index of the mixture being negative. B. M. V.

Tubular heat exchangers such as air preheaters. BABCOCK & WILCOX, LTD., Asses. of P. R. CASSIDY (B.P. 472,108, 2.4.37. U.S., 4.6.35).

Mixing machines. H. E. COX (B.P. 469,487 and 469,492, [A] 27.2.36, [B] 14.3.36).

Furnace linings.—See VIII. **Drying or heating slurry. Concrete or mortar mixers.**—See IX. **Ore concn.**—See X. **Electrical pptn. from gases.**—See XI.

II.—FUEL; GAS; TAR; MINERAL OILS.

Coal found on the Faroe Islands. P. E. RAASCHOU (Ingeniørvidensk. Skr., 1937, B, No. 17, 64 pp.).—Details are given of the extent, quantity, and quality of Faroe coals, which are of the long-burning flame lignititious type. H. C. M.

Analyses of Colorado coals. (U.S. Bur. Mines, 1937, Tech. Paper 574, 27 pp.).—Detailed data on the occurrence, reserves, quality, characteristics, production, and uses of Colorado coals are presented. The coals are mainly of sub-bituminous or bituminous rank. H. C. M.

Size classification and grading of Yorkshire coals. R. CLIVE and L. SLATER (Trans. Inst. Min. Eng., 1937, 94, 41–69).—An abstract of a Report by a Committee of the Yorkshire Advisory Committee on Research. Data concerning the particle-size distribution in colliery size grades have been critically examined, and a classification for grading Yorkshire coals <3 in. has been thereby evolved. It is suggested that the size classification should be determined by means of an upper, a mid, and a lower test-screen, and a fines screen (details given). Methods for sampling and screening for size-grading tests are described in detail. H. C. M.

Fundamentals in dustproofing coal. H. R. FIFE and P. W. EDEBURN (Amer. Inst. Min. Met. Eng., 1937, Tech. Publ. 866, 14 pp.; cf. B., 1937, 310).—The extent of the exposed surface area of the coal and its absorption properties for the dust-retaining film are the most crit. factors affecting the efficiency of fly-dust prevention. Run-of-mine coal (Freeport seam) was treated with paraffin wax and, after drying and screening, it was found that the wax was distributed uniformly over the various coal sizes from 1 in. to 0 as a function of the exposed surface. Pre-tipple treatment of mine-run coal is an economical method of controlling dust during the tipple operations and improves the degradation trend in the tipple. H. C. M.

Treatment [of coal] by oil or chemical to improve quality. D. JAMIESON, jun. (1935 Year-book Coal Mine Mech., Amer. Min. Congr., 289–293).—CaCl₂ and mineral oil are the best dedusting agents for coal. In using an oil emulsion, 1 gal. of oil is usually mixed with 3–5 gals. of H₂O and an emulsifying agent. Straight oil is preferable to emulsions. A high-pressure method of application is described.

CH. ABS. (e)

Valuation of washed coal. D. R. MITCHELL (1935 Yearbook Coal Mine Mech., Amer. Min. Congr., 244—250; Proc. Ill. Mining Inst., 1935, 51—55).—A discussion. CH. ABS. (e)

Measurement of the quantity and pressure of methane in coal. J. I. GRAHAM (Trans. Inst. Min. Eng., 1937, 94, 122—131).—A method is described for assessing the gas content of a coal as worked at the coal face, or for determining the quantity of CH_4 in an unworked seam from which a core may be taken by a boring machine. A small lump (20 g.) of the coal is placed in a cylindrical steel shell fitted with a movable plunger (details given), with which the coal is crushed in a vac. after sealing-in the shell. The sealed shell and crushed coal are then heated in an oil-bath at 100° , the gases evolved being pumped off periodically, measured, and then analysed. Heating is continued until evolution is complete, usually 24 hr. From a determination of the gas content of the coal and a knowledge of the character and moisture content of the coal, the pressure of gas in the coal may be calc. by making use of data obtained previously (cf. *ibid.*, 1921—2, 57, 298) relating pressure of gas with quantity adsorbed. Further data on the effect of moisture on quantity of CH_4 adsorbed by a Warwick coal are given. H. C. M.

Characterisation of natural humus substances. W. SCHEELLE (Kolloid-Beih., 1937, 46, 368—424).—The equiv. wt. of humic, huminic, and hmatomelanic acids prepared from various kinds of lignite and peat has been determined by conductometric and potentiometric titration. The vals. obtained vary between 150 and 211. The mol. wt., calc. from the diffusion coeff., varies from 8000 to 26,000 in different specimens, but in presence of a slight excess of alkali the vals. are halved. This effect is reversible, and is not due to hydrolysis. F. L. U.

Humic acids. I. UBALDINI (Kolloid-Z., 1937, 81, 188—190; cf. A., 1934, 1219).—A reply to criticisms by Stadnikov (B., 1937, 866). F. L. U.

Plastic phenomena in the compression of earthy brown coals. G. AGDE and K. E. VETTER (Braunkohle, 1937, 36, 845—848).—The pressure necessary to cause brown coal to flow through a nozzle increases rapidly as the H_2O content of the coal is decreased. Over the range of H_2O contents and pressures normally used in briquetting, the coals are not plastic; under briquetting conditions the compression only brings about a reduction in the distance apart of the adhesion surfaces of the particles. A. B. M.

Dependence of the briquetting behaviour of raw brown coals on their humic acid and water contents. G. AGDE and K. E. VETTER (Braunkohle, 1937, 36, 813—817).—The strengths of briquettes made from four brown coals exhibited max. vals. for definite H_2O contents of the coals. The correlation between strength of briquette and humic acid content of the coal was imperfect. The results support the capillary- H_2O film theory of Kegel and Fritzsche (cf. *ibid.*, 1932, 31, 253), but are not in accord with the ideas of Blum (cf. B., 1932, 966). A. B. M.

Production of durable brown-coal briquettes. A. FRITZSCHE (Braunkohle, 1937, 36, 643—658, 665—677).—Briquettes must not only withstand handling and transport, but must retain their form during combustion or gasification, or yield a coherent semi-coke. The raw material should be so pulverised that its apparent d as fed to the presses is as high as possible. Drying should aim at leaving a uniform distribution of moisture in coarse and fine particles. Briquettes for direct combustion or gasification can be made from material containing up to 15% of H_2O , but for the production of semi-coke 10% should not be exceeded. A process is, however, under trial in which briquettes containing 12—14% of H_2O are treated with steam at 5 atm., whereby the properties of the subsequent semi-coke are improved. The effect of the pressure applied in the press, its duration, and the manner of application (periodic or continuous) is discussed in relation to various types of press, reciprocating and rotary. A. R. PE.

Brown coal for central heating. O. WEIMANN (Braunkohle, 1937, 36, 693—708).—Brown-coal briquettes can be used successfully in domestic boilers of modern design, a no. of which are described in detail. Their easy ignition makes them specially suitable for small plants. A. R. PE.

Brown-coal semi-coke for use as fuel and in gas production. E. RAMMLER (Braunkohle, 1937, 36, 708—727).—The domestic consumption of this fuel is nearly const., but the industrial consumption has increased very much in the last two years. It is used extensively in pulverised form, and also for steam-raising on special grates, for gasification (B., 1937, 1153) purposes, including vehicle propulsion, and for production of water-gas (B., 1937, 638) and Fischer-Tropsch synthesis gas. These uses, and plant for them, are fully discussed. A. R. PE.

Determination of sulphur in brown-coal pyrites. G. ELTESTE (Chem.-Ztg., 1937, 61, 880—881).—Discrepancies in results of different analysts were traced to the presence of small quantities of org. material, derived from the brown coal and not destroyed in the pretreatment with aqua regia and KClO_3 , which retarded the complete pptn. of the BaSO_4 . Correct results were obtained when the solution was set aside for 12 hr., instead of 2 hr., before filtration. A. B. M.

Physical alterations that occur during the Fleissner drying of wood, braunkohle, and lignite. A. M. COOLEY, jun., and I. LAVINE (Fuel, 1937, 16, 320—326. Cf. B., 1931, 97; 1932, 758).—Microscopical examination of thin sections, prepared by grinding or by slicing, of raw and steam-dried tamarack wood, Austrian braunkohle, and Dakota lignite shows that the last two exhibit varying degrees of woody structure and that steam-drying of all three materials causes a collapse of the smaller cells. It also advances the humidification of the spring wood. A. B. M.

Coal-in-oil ("colloidal") fuel. W. SCHÖNING (Arch. Wärmewirts., 1937, 18, 283—285).—Recent developments are summarised. R. B. C.

Practical results of heating Otto coke ovens by blast-furnace gas. S. YAGI (J. Fuel Soc. Japan,

1937, 16, 84—85).—The ovens are of the compound type and are engaged in blast-furnace coke production. The vol. of blast-furnace gas per ton of pig Fe produced is 141,000 cu. ft. (calorific val. 107 B.Th.U. per cu. ft.), of which 29,000 cu. ft. are consumed at the ovens per ton of coal carbonised and a further 35,000 cu. ft. at the hot-blast stoves. The vol. of coke-oven gas produced per ton of coal carbonised is 12,400 cu. ft. (calorific val. 520 B.Th.U. per cu. ft.), corresponding with 20,500 cu. ft. of oven gas per ton of Fe produced, this vol. of gas together with 77,000 cu. ft. of blast-furnace gas being available for steel-heating purposes.

H. C. M.

Combustion of solid fuels, especially brown coal. J. ILWITZKI (Braunkohle, 1937, 36, 797—802, 817—821).—Methods of calculating the calorific val., air requirements, and the vol. and composition of the flue gases from the ultimate analysis of the coal, and of using these data to determine the thermal efficiency and overall efficiency of a boiler plant, making use of the i - T diagram (i is the heat content and T the temp. of the flue gases), are outlined. A. B. M.

Up-grading of fuels. R. DRAWE (Gas-u. Wasser-fach, 1937, 80, 806—810).—The advantages of low-temp. carbonisation of coal and brown coal are discussed, with special reference to the superiority of the graded solid products over other solid fuels. The continuous gasification of brown coal with O_2 and superheated steam at 20 atm. is described. The plant at Hirschfeld has supplied the town of Zittau during the past year with gas of calorific val. 4280 kg.-cal. per cu. m. and d 0.448. Modification of the process to produce liquid fuel *via* the Fischer-Tropsch synthesis is contemplated. A. R. PE.

Low-temperature carbonisation of bituminous coal by the B.-T. process. W. KÄRSTEN (Teer u. Bitumen, 1937, 35, 291—294; cf. B., 1937, 103).—A large-scale plant at Hindenburg, Upper Silesia, is diagrammatically described. Yields and costs are given. High-grade, low-temp. coke can be produced from non-coking coals. R. B. C.

Reduction of the caking power of lump bituminous coal prior to low-temperature carbonisation in a current of heating gas. A. JÄPPELT and A. STEINMANN (Oel u. Kohle, 1937, 13, 1027—1030).—“Flaming” gas coals can be reduced in caking power, and so rendered suitable for carbonisation by internal heating, by pre-oxidation, *e.g.*, by heating in a current of flue gas containing 8% of O_2 at 120° for 6—12 hr. Such treatment reduces also the H content of the coal. Coking coals of higher caking power require heating in an inert atm. for longer periods and at a higher temp., *e.g.*, 350°, which, however, must be < the softening temp. of the coal. After such pretreatment a good semi-coke is obtained on carbonisation.

A. B. M.

[Products from] carbonisation of wood *in vacuo*. R. JACQUEMAIN (Bull. Assoc. Chim. Sucri., 1937, 54, 529—537).—Dry beech wood, distilled at temp. up to 160°/12 mm., yielded about 52.5% of liquid products and 29% of coke. The yields of AcOH (7.38), HCO_2H (1.45), MeOH (1.06), and MeCHO (0.87%) were about the same as those obtained by Klason (B., 1915, 707), who used a higher

vac. Relatively large yields of CH_2O were also obtained; under atm. pressure only traces are formed. Small quantities of $COMe_2$ were found. Many other products were identified but the yields are not stated. J. H. L.

Technical developments [during 1936] in the gas and allied industries. H. D. GREENWOOD (Fuel Econ. Rev., 1937, 49—54).—The carbonisation of cannel coal, the Fischer-Tropsch process, and the removal of S compounds from town's gas etc. are discussed. R. B. C.

Fundamentals of smoke observation. J. S. OWENS (Fuel Econ. Rev., 1937, 37—38, 54).—Problems of smoke measurement are discussed.

R. B. C.

Comparison of granulated active charcoals. A. LOTTERMOSER and C. Y. TU (Kolloid-Beih., 1937, 46, 425—479).—The properties of active C made from coconut shell, walnut shell, and pine sawdust, and soaked in solutions of $ZnCl_2$, H_3PO_4 , and KCNS before activation, have been compared. The specimens are characterised by their ash content, apparent and true d , heat of wetting by H_2O and org. liquids, porosity, surface, and electrical conductivity. Examination of the adsorptive efficiency, using H_2 , CO_2 , and SO_2 , shows that this is independent of the starting material, but increases in the order $ZnCl_2 < H_3PO_4 < KCNS$. The efficiency of C prepared by any one process increases with decrease in mineral content, but no relation exists between efficiency and ash content of differently treated specimens. C activated after treatment with KCNS is superior to the others in respect both of velocity of adsorption and of the quantity adsorbed at equilibrium.

F. L. U.

Foundry coke. ANON. (Coal Carbonisation, 1937, 3, 163—165, 170—172, 175).—The views of various workers on the properties desirable in foundry coke are summarised.

R. B. C.

Carbon in coke. A. VAN AHLEN (Brennstoff-Chem., 1937, 18, 420—427).—Recent work on the structure of different types of C, and of coal, as revealed by X-ray analysis, or by electrical conductivity measurements, is reviewed. It is concluded that all cokes consist essentially of graphite, together with some highly complex hydrocarbons; amorphous C does not exist as a separate modification, but is graphite of very small crystal size. A structure resembling that of graphite is exhibited by coal, particularly by anthracites. The changes which occur on carbonisation are discussed. A. B. M.

Hydrogenation of South African coals. A. J. PETRICK, B. GAIGHER, and P. GROENEWOUD (J. Chem. Met. Soc. S. Africa, 1937, 38, 122—144).—The coals were hydrogenated in a 5-litre rotary converter, using 250 g. of coal, 167 g. of heavy tar oil as vehicle, and 5% of MoS_2 (added as NH_4 molybdate + S) as catalyst. The initial H_2 pressure was 100 atm. and the rate of heating was so adjusted that the reaction temp. (450°) was reached in 2 hr. and thereafter maintained const. for 1 hr. The effect of preheating the coal with HCl was studied, but the results were indefinite and this procedure was not

adopted. Of some 60 coals tested, about 26 gave fair results, *e.g.*, <25% of the hydrogenated product insol. in C_6H_6 , whilst only a few gave comparatively good results, *e.g.*, <20% of insol. material. The Transvaal coals gave better results than the Natal coals; this is possibly due to the lower rank of the former, as indicated by their lower C content and higher H and O contents. Preoxidation of the Natal coals, however, brought about no improvement.

A. B. M.

Hydrogenation of Chinese coals. C. C. HSIAO and C. L. LO (*J. Chem. Eng. China*, 1937, 4, 248—254).—In preliminary tests, coal ground to 100-mesh and dispersed in an equal vol. of low-temp. tar was subjected to H_2 pressures of 118 atm. (no catalyst) and heated (at rate of $2^\circ/\text{min.}$) to 450° , a pressure of 290 atm. being developed, and the temp. maintained for 2 hr. Several samples, including brown and bituminous coals, gave high % conversion and high yields of low-boiling liquids, the best being Wukang brown coal, which yielded 16% of light oil (< 250°) and 58% of heavy oil (> 250°) with 95% conversion (moisture- and ash-free basis); a Chian coal gave 13, 43, and 95%, respectively. I. C. R.

Preparation of raw gas for Fischer synthesis at Miike. M. TAKEI (*J. Fuel. Soc. Japan*, 1937, 16, 87—88).—A satisfactory synthesis gas is obtained by admixing water-gas with coke-oven gas which has been subjected to CH_4 cracking in a high-temp. vertical stove. The heat required for CH_4 cracking is provided by the waste gas resulting from the Fischer process. H. C. M.

Improving the oil results in a water-gas machine. O. A. BARENSCHER (*Gas Age-Rec.*, 1937, 80, No. 2, 23—26, 35).—Useful hints on methods of operating a carburetted water-gas plant to obtain the most efficient cracking of the oil and a gas of high calorific val. are given. R. B. C.

Reaction velocities at low temperature in the "water-gas" equilibrium. C. PADOVANI and A. LOTTERI (*J.S.C.I.*, 1937, 56, 391—395T).—A kinetic study of the equilibrium $CO + H_2O \rightleftharpoons CO_2 + H_2 \pm 9860 \text{ g.-cal.}$ has been undertaken, to investigate the influence of excess of H_2O vapour, temp., and pressure on the velocity with which equilibrium vals. are reached. It was found from a series of determinations at pressures from 1 to 25 atm. that the vals. of *k*, the velocity coeff., diminish proportionately to the increase in pressure. From this result, taking into account the space velocity, it is shown that the highest yields are obtained at about 15 atm. pressure. To obtain high yields it is necessary to use a very large excess of H_2O ($H_2O : CO$ ratios from 3 to 4) and space velocities $\gt 300$ —400. The influence of high ratios of H_2O to CO becomes particularly marked for high space velocities, whereas for vals. of the latter between 100 and 200 practically no appreciable advantage is obtained. Using a ratio of H_2O to CO of 2, it is shown that high yields are possible only with temp. $\sim 450^\circ$ and 500° at which, with space velocities of about 500, yields of 75—80% can be realised; lower temp. result in much lower yields.

Separation of ethylene fraction of coal gas. P. K. SAKMIN (*J. Chem. Ind. Russ.*, 1937, 14, 1169—1170).—Polemical, against Torotscheschnikov (*B.*, 1937, 863). R. T.

Gas detoxification. (A) F. SCHUSTER. (B) O. ZAHN (*Chem.-Ztg.*, 1937, 61, 881—882; cf. *B.*, 1937, 515).—(A) The complete removal of CO_2 from town's gas detoxified by the process of Bössner and Marischka (*B.P.* 372,089; *B.*, 1932, 633) may result in difficulties in the regulation of gas-combustion appliances due to its low *d*. The presence of CO_2 in the gas detoxified by other processes, *e.g.*, that in use at Hamelin gasworks (cf. *B.*, 1936, 725), gives no increased corrosion of the mains. The process described by Zahn has other disadvantages, *e.g.*, loss of activity of catalyst due to absorption of S, probable rapid disintegration of catalyst under the working conditions, etc.

(B) A reply to Schuster's criticisms. A. B. M.

Removal of sulphur compounds from [town's] gas. (A) H. HOLLINGS. (B) W. K. HUTCHISON. (C) R. H. GRIFFITH (*Inst. Gas. Eng., Comm.* 175, 1937, 50 pp.; cf. *B.*, 1936, 8).—(A) The active C process, the oil-washing process, and a modification of the latter in which CS_2 is recovered by means of $MeOH-NaOH$ so that the oil can remain fully saturated with benzol, and the catalytic process referred to below are reviewed. Costs are briefly considered.

(B) A new oil-washing plant treating 7 million cu. ft. of coal gas per day is described in detail. Steam economy in stripping the large vol. of oil used is attained by vac.-distillation. Appendices give methods of determining individual S compounds in the gas and of examining wash-oils.

(C) A process is described in which a sulphided Ni catalyst supported on kaolin causes complete combustion of CS_2 , the SO_2 being removed by Na_2CO_3 . NO is simultaneously removed so that gum formation will be prevented. Some H_2 is oxidised, O_2 is completely consumed, and the calorific val. of the gas raised so that benzol extraction or steaming can be intensified. A. R. PE.

Recovery of sulphur from fuel gases. I. M. SECCHI (*Chim. e l'Ind.*, 1937, 19, 574—578).—An account of the chief industrial methods employed. O. J. W.

The E.H.B. [Berkhuijsen] spray [gas] washer. J. RUTTEN (*Gas- u. Wasserfach*, 1937, 80, 798—799).—The washer consists of a series of cylindrical chambers, short relatively to their diameter, each having a narrow circumferential aperture through which the gas escapes outwards, whilst a series of radial jets spray the washing liquid inwards. The pressure loss is low and with suitable jets either aq. or oily liquids can be used for washing, cooling, or any process requiring intimate contact of liquid and gas. A. R. PE.

Precision combustion analysis of gases. E. H. BOOMER and C. A. JOHNSON (*Canad. J. Res.*, 1937, 15, B, 363—366).—Modified procedure for determining H and C in gases, especially those containing vapours of volatile liquids, is described. E. S. H.

Determining hydrogen sulphide content of gas in the field. R. M. LILLY and N. P. CHESNUTT

(Oil and Gas J., 1937, 36, No. 14, 52, 55, 58, 70).—The requirements of a satisfactory process are outlined. The method adopted is the reduction of $\text{Ce}(\text{SO}_4)_2$, using *o*-phenanthroline- Fe^{II} complex as indicator. Advantages of the process (unaffected by mercaptans) are discussed and apparatus is described.

J. W.

Portable apparatus for precise gas analysis. S. W. SLEIGH (J.S.C.I., 1937, 56, 430—434T).—In existing instruments using fresh reagents, traces of reagent may be transferred to the burette, and calibration with dry Hg does not correspond with the analytical practice of moistening with dil. acid to preserve constancy of v.p. For an accuracy of 0.01%, a new instrument using small amounts of fresh reagent is fitted with a compensator and an aq. manometer. A small connecting space between burette and pipette allows the elimination of errors of transference, and a standardised method of calibration with moist Hg is described, depending on the use of Hg from the pipette for sampling, so that any traces of acid in the burette remain undisturbed in vol. with the exception of the film between Hg and glass. By raising the Hg meniscus sufficiently slowly, only the Hg meniscus need be read during calibration or analysis. Very satisfactory operation in mine air analysis is claimed.

Electrically heated cauldrons for tar and bitumen. H. KALPERS (Teer u. Bitumen, 1937, 35, 228—231).—Various types are diagrammatically described.

R. B. C.

Modern road tars. W. J. HADFIELD (Gas J., 1937, 220, 597—601).—Experiences gained with both tar macadam and surface-dressed roads are discussed, and reference is made to the use of non-toxic tars.

H. C. M.

Constitution of road tar. Introduction. W. G. ADAM and F. M. POTTER. I. Solvent method for examination of coal tars. W. G. ADAM, W. V. SHANNAN, and J. S. SACH. II. Physical phenomena associated with certain road tars. W. G. ADAM, D. G. MURDOCH, and J. E. MOTT (J.S.C.I., 1937, 56, 413—414T, 414—417T, 417—422T).—The comprehensive scheme of road tar research undertaken at Beckton is outlined.

I. The setting properties of high- and low-aromatic tars are discussed. At ordinary temp. the latter set more slowly, but at $\sim 40^\circ$ there is no apparent difference. The setting properties of a fluxed road tar are governed by the nature of the soft pitch used, the fluxing oil being of secondary importance. High- and low-aromatic soft pitches were fractionated by means of $\text{C}_5\text{H}_5\text{N}$, C_6H_6 , and light petroleum into amorphous, resinous, and non-resinous constituents. The viscosity-conferring characteristics of the C_3 fractions (sol. in $\text{C}_5\text{H}_5\text{N}$, insol. in C_6H_6) differed considerably, those of low-aromatic origin being much more effective. Reasons are suggested for the high durability of low-aromatic tars. The non-resinous fraction (sol. in light petroleum) from low-aromatic soft pitch had slow drying characteristics and, at temp. $< 32^\circ$, exhibited the broken film phenomena described in Part II. Tars were reconstituted from the various fractions, and substitution of the non-resinous fraction of low-aromatic soft pitch by that

from the high-aromatic conferred rapid setting properties on otherwise low-aromatic tar. Treatment of the non-resinous fractions with Me_2SO_4 and conc. H_2SO_4 left unsulphonatable material amounting to 1.0% and 7.9% in the high- and low-aromatic fractions, respectively, corresponding with 0.6% and 5.1% in the soft pitches. Addition of unsulphonatable material from either source to high-aromatic tar retarded the setting, as little as 1% having a definite effect. The mist phenomena described in Part II also became apparent. It is concluded that the slow setting properties at ordinary temp. of low-aromatic tar are due to the presence of sufficient of this material to restrict evaporation. Properties of the unsulphonatable material are discussed. It has been found possible to lower the transition point (Part II) of low-aromatic tars and improve their setting properties by (a) chemical methods of treatment, (b) blending with high-aromatic tar, (c) addition of certain materials, e.g., 10% of asphaltic bitumen.

II. When tar films were spun in a specially designed apparatus at speeds between 500 and 1800 r.p.m., low-aromatic tars give films showing striking irregularities, which change from transverse striations to longitudinal breaks as the temp. of spinning is raised, and finally disappear at the "transition temp."; for a typical low-aromatic tar this is 32° . High-aromatic tars give smooth, unbroken films at ordinary temp., and curves are given correlating film thickness with temp., duration of spinning, speed of rotation, and η of tar. The effect exhibited by low-aromatic tars is shown to be independent of evaporation or oxidation. The "mist effect" produced by compressing the surface of low-aromatic tar is described; it disappears at the "transition temp." found by the spinning method. The effect is independent of evaporation or oxidation, and is not shown at ordinary temp. by high-aromatic tars. Apparatus for determining "transition temp." by the "mist effect" method is described.

Equi-viscous temperature of road tars. STANDARDIZATION OF TAR PRODUCTS TESTS COMMITTEE (J.S.C.I., 1937, 56, 422—427T).—The new edition of "Standard Methods for Testing Tar and its Products" will include methods for obtaining the equi-viscous temp. (E.V.T.) of a tar (*i.e.*, the temp. at which its η is 50 sec. when measured on the standard 10-mm. orifice tar viscometer). The paper describes the manner in which the methods were deduced. From experimental data on a large no. of tars it is concluded that for ordinary commercial purposes the E.V.T. can be obtained with a satisfactory degree of accuracy from a η determination at one temp., if the temp. of test differs by $> 2.5^\circ$ from the E.V.T. One table, giving the difference between the temp. of test and the E.V.T. for various vals. of measured η , suffices for a range of E.V.T. of 17.5 — 55° . The possible error in the use of the table is $> 0.3^\circ$. By an extended use of this table the true E.V.T. may be deduced if desired. Low- η tars of E.V.T. $< 17.5^\circ$ are to be examined normally in a viscometer having a 4-mm. orifice. The E.V.T. of these low- η tars can also be deduced from a single η determination if the temp. of test is between 17.5° and $22.5^\circ >$ the

E.V.T., and another conversion table is provided for this purpose. The possible error in this case may be up to 1.3° . If the true E.V.T. of a low- η tar be required, the standard 10-mm. orifice viscometer must be employed.

Equi-viscous temperature of pitches. G. H. FUDGE and A. L. DEADMAN (J.S.C.I., 1937, 56, 427—430r).—Simple relationships exist for pitches between the E.V.T. and standard pitch tests, including the ring-and-ball, Kraemer-Sarnow, the cube, the twisting point, the float, and the penetration tests. Fluxing curves are given showing that the change in E.V.T. on fluxing pitch with tars or tar oils is approx. linear over a range of about 20° .

Determination of the bitumen content of powdered rock asphalt. F. CARDIA (Strade, 1937, 19, 541—547; Road Abs., 1937, 4, No. 455).—Details are given of a comparison between the Soxhlet extraction method and a simple extraction method, the latter giving the more concordant results. The variations in the former are attributed to fine particles of mineral matter being carried over.

T. W. P.

Determination of pyridine-insolubles in bituminous coal tar or pitch. H. MALLINSON (Teer u. Bitumen, 1937, 35, 231).—A 3-g. sample is treated on a water-bath with 300 c.c. of C_5H_5N . The hot solution is filtered and the ppt. washed first with hot C_5H_5N and then with hot benzol, and dried at 105° .

R. B. C.

Temperature-surface tension curves of coal bitumens in relation to degree of carbonisation and mode of origin of the coal. D. J. W. KREULEN and N. M. RODENBURG (Chem. Weekblad, 1937, 34, 649—650).—Temp.- γ curves for the bitumens from representative Tertiary Tanjoeng-Enim coals and English and German carboniferous coals are compared with those for the low-temp. tars and montan wax. The curves fall into two fairly well-defined series, depending on the degree of carbonisation of the coal.

S. C.

Critical surface tension of asphaltic bitumens and tar solutions. F. J. NELLENSTEYN (Chem. Weekblad, 1937, 34, 646—649).—The colloidal nature of asphaltic bitumens and coal tars (pitch) are discussed. Org. liquids having $\gamma <$ the crit. γ act as flocculating agents, whilst those with $\gamma >$ the crit. val. act as dispersing agents, *i.e.*, "solvents." The various kinds of asphaltic bitumens show only slight differences in γ . The γ for coal tars is \gg that for the bitumens, and solvents for the latter usually flocculate the tars on this account. Flocculation is not related to the aromatic or aliphatic nature of the tar or bitumen under test. Asphaltic bitumen is flocculated by org. liquids with $\gamma < 24$ dynes/cm. and is completely dissolved by liquids with $\gamma > 26$ dynes/cm. With liquids of $\gamma 24$ — 26 dynes/cm., dissolution or flocculation may occur, depending on the asphalt-bitumen micelle. The lower γ of the bitumen makes it impossible to admix $> 20\%$ of coal tar without flocculation occurring. The "free C" pptd. on flocculation with CS_2 forms a negligible constituent in the case of the bitumen, but with coal tar it is the main component, the micelle.

S. C.

Removal of tar from, and bleaching of, lignite wax. A. DAVANKOV and O. KONOVALOVA (Prom. Org. Chim., 1937, 4, 30—34).—The crude wax is dissolved in 1.5—2 vols. of C_6H_6 , 4—8 vols. of EtOH are added, the mass is filtered, and the residue washed with 10—15 vols. of 3 : 1 EtOH- C_6H_6 , when tar-free wax is obtained in 60—65% yield. The wax is bleached by heating at 105 — 115° for 7 hr. with $K_2Cr_2O_7$ in 1 : 1 48% H_2SO_4 —4% HNO_3 .

R. T.

[Use of] mud solution with sodium silicate [in oil wells]. V. I. OKOLELUICH (Groz. Neft., 1935, 5, No. 1—2, 26—30).—This material is suitable for strengthening oil-well walls.

CH. ABS. (e)

Preparation of flooding water to prevent plugging oil sand. H. M. RYDER (Oil and Gas J., 1937, 36, No. 19, 60, 62).—Suspended matter is removed by filtration, being flocculated by alum if necessary. Fe and H_2S are removed by aëration and algæ by $CuSO_4$. Corrosion by acid waters is prevented by addition of CaO or soda ash.

J. W.

Petroleum of the Soviet Union and their classification. L. ROSENFELD (Petroleum, 1937, 33, No. 47, 4—12).—Characteristics of oils from 54 localities are given.

Conversion of methane into petroleum under natural conditions. V. A. SOKOLOV (Bull. Acad. Sci. U.R.S.S., 1937, Sér. Chim., 947—958).— CH_4 is converted under natural conditions, *e.g.*, by ionised air in surface soil, into neutral, stable compounds; in absence of air petroleum is formed and natural deposits thereof may have been formed from CH_4 under the influence of radioactive minerals. Large deposits of natural gas diffuse rapidly into the atm.

R. S. C.

Polymerisation of hydrocarbons as a means of producing fuels and lubricating oils. E. NEYMAN-PILAT (Petroleum, 1937, 33, No. 44, 1—8).—A comprehensive review of the present state of knowledge on this subject with many references. Sections are devoted to polymerisation by heat and pressure only, and polymerisation in presence of H_2SO_4 , $AlCl_3$ and other metallic chlorides, and H_3PO_4 . The alkylation of aromatic hydrocarbons in presence of H_2SO_4 , P_2O_5 , $AlCl_3$, and BF_3 is described and polymerisation by means of the silent electric discharge.

H. C. R.

Apparatus used during examination of petroleum from Koss-Tschagyl in the laboratory. G. D. HALPERN (Bull. Acad. Sci. U.R.S.S., 1937, Sér. Chim., 959—967).

R. S. C.

Microscopical examination of crude petroleum. J. M. SANDERS (J. Inst. Petroleum Tech., 1937, 23, 525—573).—Special apparatus and technique have been developed for investigating any portions of organised bodies which have been preserved in crude oil. Many samples of oil, chiefly Rumanian and Mexican, have been examined. In general, the oil is first diluted with a suitable solvent (*e.g.*, kerosene, C_6H_6 , CS_2), strained through a brass sieve, and the micro-objects present are conc. by special filters combined with gravity or centrifugal separation methods. Details of the technique and microscopical accessories are given. The significance

of chemical evidence as an aid to microscopical investigation is also discussed. A description is given (with numerous photomicrographs) of the predominant types of material found. They are classified as (a) mineral and recent material, (b) decay-resistant organised material, (c) decay-arrested organised material. The significance of the results and their bearing on problems related to the genesis of oil are discussed, as well as the possibility of using the method for correlation purposes and increasing our knowledge of ancient forms of life. There is evidence that spores and unicellular algae have contributed their waxy, fatty, resinous, or oily secretions to the eventual petroleum complex, leaving only their decay-resistant integuments behind.

C. C.

Vaporisation-equilibrium constants in a crude oil-natural gas system. D. L. KATZ and K. H. HACHMUTH (Ind. Eng. Chem., 1937, 29, 1072—1077).—The vaporisation-equilibrium consts. (K) for the constituents of a crude oil mixture with the natural gas associated with it were determined experimentally (pressure range 1 atm. to 3000 lb./sq. in.; temp. range 4.4—93.3°). With increasing pressures the vals. of K for all constituents other than CH_4 pass through minima and then rise towards unity as the crit. pressure is approached.

F. J. B.

Determination of unsaturated and aromatic hydrocarbons in cracked petroleum. S. S. NAMETKIN and E. A. ROBINSON (Bull. Acad. Sci. U.R.S.S., 1937, Sér. Chim., 921—938).—The determination of unsaturated hydrocarbons by S_2Cl_2 and of aromatic hydrocarbons by the Kattwinkel method in liquid and gaseous cracked petroleum is improved.

R. S. C.

Synthetic products from petroleum. G. EGLOFF (J. Inst. Petroleum Tech., 1937, 23, 645—668).—A lecture.

F. R. G.

Continuous distillation of crude and fuel oil and mineral oil residues to coke. J. BAUER and A. VENZANO (Petroleum, 1937, 33, No. 45, 5—10).—The advantages of the continuous Astra coking process over the discontinuous coking stills and the Knowles process are outlined. The continuous process is described and the plant illustrated. The charge is distilled in a series of containers which pass through a continuously heated oven and from which the coke is withdrawn while they are temporarily removed from service. Details of yields and analyses of the products of a plant of this type are given.

H. C. R.

Test carried out from May to June, 1936, [on oil-shale retorting plant] at Creveney of Société des Schistes et Pétales de Franche-Compté. BURSAUX (Ann. Off. nat. Comb. liq., 1937, 12, 295—336).—The plant comprises four rotating cylindrical retorts in which a thin layer of crushed shale is exposed to heat for short periods of time. Wt. and thermal balances are given. Under present French conditions the process is uneconomic.

R. B. C.

Selecting metal for [oil-]cracking units. S. I. VOLIFSON (Neft. Choz., 1935, 28, No. 5, 47—52).—A bibliography.

CH. ABS. (e)

Evaporation and knock-rating [of motor fuels]. O. HERSTAD (Oel u. Kohle, 1937, 13, 1007—1011; cf. B., 1937, 205).—A motor petrol was separated by distillation into (a) a series of volatile fractions by systematically removing the higher-boiling fractions, (b) a series of residues by removing the lighter fractions, and (c) into 10° fractions as in standard distillation tests. Curves connecting combustion space wall temp. with evaporation times were constructed for all these samples. The results are analysed graphically and related to the mean distillation temp. ("Kennziffer") of the samples. The evaporation time at the most favourable temp. increases with increasing "Kennziffer" with (a), but the reverse occurs with (b) with the result that the unfractionated fuel has a longer evaporation time than any of its components. The transformation temp. of the residues increase with their mean b.p., eventually coinciding with those of the unfractionated fuel. Apart from certain similarities between samples in max. transformation points and min. b.p., series (a) show the greatest transformation times up to the point where the higher-boiling fractions (>140°) begin to make their influence felt. According to transformation times, the C_8H_{18} no. of group (a) is about 80, of the complete fuel 68—70, and of group (b) about 46.

H. C. R.

Research in relation to the motor vehicle: fuels and lubricants. F. H. GARNER (J. Inst. Petroleum Tech., 1937, 23, 575—601).—Modifications of design of the fuel system have led to marked improvement in ease of starting, absence of vapour lock, rapid warming up and satisfactory acceleration and idling, and freedom from dilution. Fuel consumption has not decreased. These points are discussed mainly as they are affected by the fuel. A description is given of a special road-test room in which tests can be made at -24° to 49°. Ignition quality is the most important characteristic of Diesel fuels. The Diesel index and NH_2Ph point are useful guides to this quality with normal fuels, and, whilst engine tests have not been fully standardised, two tentative methods have been described. According to the B.S.I. specification, η should be ≥ 45 sec. Redwood at 37.8° and $\leq 85\%$ should distil over at 350°. The importance of low η and a high η index is discussed in relation to motor lubricating oils; the max. permissible η at -18° is 20,000 sec. Redwood. Other points are briefly considered, including sludge formation, bearing corrosion, oiliness agents, and oil consumption. No really satisfactory method for assessing extreme-pressure lubricants has yet been proposed. C. C.

Variables affecting flame speed in the Otto cycle engine. C. L. BOUCHARD, C. F. TAYLOR, and E. S. TAYLOR (J. Soc. Auto. Eng., 1937, 41, 514—519t).—Flame photographs were taken on a moving film through a glass window in the engine cylinder head under various operating conditions. The flame speed decreased with increasing altitude in an unsupercharged engine. Either supercharging or reducing the exhaust pressure with the inlet pressure const. increased this speed. Flame speed

decreased with increasing inlet air temp. and increasing air humidity. R. B. C.

Behaviour of mixtures of Diesel fuels of different origin. R. HEINZE and M. MARDER (Angew. Chem., 1937, 50, 747—752).—The effect of mixing fuels of different origin on the physical and chemical properties of the fuel is discussed; 12 fuels and 38 mixtures have been examined. *d* is an additive property. Cloud and pour points and flow characteristics (as shown by the Hagemann-Hammerich filter apparatus) of mixtures approximate to the mean only for distillate fuels. For cracked products cloud and pour points are above the mean, whilst the oils flow less readily at lower temp. than would be expected. The proportion of asphalt and solid impurities in a simple Diesel fuel gives some indication of the tendency for the pptn. of sediment, but in mixtures this is not the case. Addition of a fuel of low coke val. to one of high coke val. greatly retards coke formation. C. C.

Fixed ignition lag method of testing Diesel fuels. J. S. CHANDLER (Oil and Gas J., 1937, 36, No. 16, 53, 55—56).—Methods for determining ignition quality of a fuel are critically reviewed. An all-electric method was adopted. Apparatus and procedure are described. High accuracy is claimed. J. W.

Determination of the ignitability of Diesel oils on a laboratory scale. R. HEINZE and M. MARDER (J. Inst. Petroleum Tech., 1937, 23, 602—615).—Cetene nos. can be determined from various physico-chemical and physical consts., e.g., the parachor, Diesel index, ring-analysis method, *d*, calorific val., H and C content, C/H ratio, NH_2Ph point, η , etc., providing that the average mol. wt. is taken into account. An experimental relation between cetene no. and mean b.p. ("Siedekennziffer") is given for the parachor, Diesel index, and ring-analysis val. methods. $CZ_{300} = CZ_{eng.} + (300 - KZ)f$, where CZ_{300} is the cetene no. of an oil with $KZ = 300$, $CZ_{eng.}$ is the cetene no. as obtained by the CFR engine, KZ is the mean b.p. CZ_{300} is plotted against the parachor etc. For the parachor method, $f = 0.3$, for the Diesel index $f = 0.2$, and for the ring-analysis method $f = 0.1$. The *d* val. is most suitable for determining CZ , and $CZ_{eng.}$ may be calc. from the d - CZ_{300} curve, using $CZ_{eng.} = CZ_{300} - (300 - KZ)f$, where $f = 0.40, 0.35, 0.30, 0.25$ for $KZ = 200, 250, 300,$ and 350 , respectively. CZ_{300} can be obtained directly using a specially calibrated areometer. C. C.

Methyl alcohol as motor fuel. W. WILKE (Oel u. Kohle, 1937, 13, 1030—1038).—Comparative data on the calorific val., air requirement, latent heat, v.p., explosive limit, rate of combustion, etc. for MeOH and other motor fuels are shown graphically, and their significance from the viewpoint of engine performance is discussed. Results of tests carried out with different types of engine show that a higher thermal efficiency is obtainable with MeOH than with benzine or a benzine-benzol blend. The anti-knock properties of MeOH permit it to be used at relatively high compression ratios. A. B. M.

Alcohol—its use as a motor fuel. G. B. HOBBS (J. South African Chem. Inst., 1937, 20, 33—43).—A review. H. C. M.

Engine starting with gasoline-alcohol blends. N. ISHII (J. Fuel Soc. Japan, 1937, 16, 79—80; cf. B., 1936, 356).—The lowest inflammation temp. of gasolines with various A.S.T.M. 10% points, and of the same gasolines admixed with 10% of EtOH, at an air-fuel ratio of 1:1 have been determined. The results indicate that almost equal ease of starting will be obtained when using a gasoline alone or blended with 10% of EtOH. H. C. M.

Natural gasoline total heat charts. E. G. RAGATZ and E. R. MCCARTNEY (Petroleum World, 1935, 32, No. 9, 43—49).—Data for individual paraffins from CH_4 to C_5H_{12} , and for two residue fractions of 60° and 80° Amer. Petroleum Inst. gravity, are recorded. CH. ABS. (e)

Specifications for aviation gasoline. W. F. HAMILTON (Petroleum World, 1935, 32, No. 10, 57—58).—A discussion. CH. ABS. (e)

(A) High-grade aviation oils from Surakhani bright stocks. **(B) Aviation oil "Tziam" in an air-cooled aviation motor.** D. J. KOLOMATZKI and L. V. SHIRNOVA (Neft. Choz., 1934, 26, No. 12, 49—55; 1935, 28, No. 5, 58—62).—(A) A Surakhani bright stock was treated with 150% of PhNO_2 and blended with 15—20% of turbine oil. The product had d 0.900, η_{50} (Engler) > 19.0 ($\eta_{100} < 3$), pour point $> 17^\circ$, Brenken flash point $< 235^\circ$, Conradson C no. $> 0.25\%$, acidity > 0.14 mg. KOH, and ash $> 0.01\%$.

(B) Solvent-treated bright stock was much superior to other oils tested. CH. ABS. (e)

Catalytic desulphurisation of gasolines from Barzass sapropelites and Kashpira shales at ordinary pressure. I. N. TITZ, N. I. SCHUIKIN, and P. F. EPIFANSKI (Neft. Choz., 1935, 28, No. 5, 52—58).—The catalyst was prepared from $\text{Ni}(\text{NO}_3)_2$ and $\text{Al}(\text{NO}_3)_3$ by pptn. of the hydroxides and reduction in H_2 . Complete desulphurisation was obtained for gasolines low in S by treating with H_2 at 400° . Repeated treatments were needed for a high [S]. The catalyst was poisoned after a comparatively short time. Formation of unsaturated compounds occurred at 400° . CH. ABS. (e)

Purification of light oils obtained by dry distillation of bituminous coal. I. Introduction, literature, and patents. G. RÜHL (Brennstoff-Chem., 1937, 18, 413—420).—The history of benzol production is outlined, and the literature relating to the gum-forming constituents and their removal is summarised. A. B. M.

Amylene fraction. II. O. G. PIPIK (Azerb. Neft. Choz., 1935, No. 4, 61—66; cf. B., 1936, 536).—The unrefined light vapour-phase fraction does not yield sulphone even in presence of a catalyst, owing to the presence of a negative catalyst. The latter is removed by refining with 10% H_2SO_4 . A small amount of the catalyst produced by the action of SO_2 on amylenes causes rapid formation of gums in an insufficiently-refined light vapour-phase cracked fraction. CH. ABS. (e)

Catalysis in the mineral oil industry. V. N. IPATIEFF (Petroleum, 1937, 33, No. 45, 1—5).—A lecture on the development of polymerisation and other reactions enabling natural and cracked gases to be utilised for petrol production. The superiority of catalytic polymerisation over cracking as a method for economically utilising petroleum is emphasised and the various reactions due to the author and others are outlined.

H. C. R.

Photochemical studies of mineral oils. I. Photo-oxidation of mineral oils. II. Absorption spectra of hydrocarbons and mineral oils. E. VELLINGER (Ann. Off. nat. Comb. liq., 1937, 12, 195—249, 250—281).—I. Degassed oils from various sources were exposed at room temp. to light from a 300- or 500-watt electric bulb and the amount of O_2 absorbed was measured. The apparatus and technique used are described. The rate of oxidation was \propto the intensity of the light and the quantity of the light absorbed (time of irradiation). Darkening, preceded in some cases by slight lightening in colour, occurred, and oxygenated compounds, CO , CO_2 , and H_2O were formed. The photo-oxidation of the oils decreased as the amount of H_2SO_4 or activated clay used in refining was increased, and was only slightly inhibited by addition of small amounts of C_5H_5N , thiophen, β - $C_{10}H_7NH_2$, etc. Photo-oxidation affected the interfacial tension of the oils against H_2O , especially in the case of Venezuelan oils.

II. The absorption spectra of photo-oxidised oils differed from those of untreated oils only in the visible and ultra-violet regions.

R. B. C.

Practical methods used to prevent corrosion from Mid-continent oil. R. E. PUCKETT (Oil and Gas J., 1937, 36, No. 19, 44—46, 48).—A sudden virulent corrosion due to salts in the crude oil was prevented by injection of NH_3 gas into the crude furnace. HCl is believed to be an active agent in this corrosion. Field neutralisation of the crude oil is recommended. Salts may readily be removed by electrostatic pptn. Corrosion in a high-pressure cracking still at 385 — 440° was due to S and was accelerated by some unknown compound. This was prevented by treatment with CaO prior to cracking. A C—Mo steel resisted corrosion by S better than a plain C steel. Analytical methods used are described.

J. W.

[Lubricating] oil purification. A. G. CAHILL (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group II, 35—41).—The relative advantages of the batch and the by-pass or continuous system are given. The type of plant available and its method of installation are described. A combination of washing and centrifuging the oil will remove both sludge and H_2O -sol. acids.

H. C. R.

Filters as an aid to lubrication. J. A. PICKARD (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group II, 160—168).—The various methods of oil filtration are described and the advantages of by-pass filtration with filters of the composite-edge type (in which the oil passes through discs of paper united at their edges into a central drainage channel) are illustrated by photomicrographs of metal grindings

which have passed through filters of various types. Industrial types of these filters are shown.

H. C. R.

Flow characteristics of petroleum lubricants. D. P. BARNARD (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group IV, 13—20).—Arveson's const.-shear viscosimeter is described. A diagram relates apparent viscosity (η_a) with rate of shear for greases with increasing soap content. The tendency with conventional greases is for η_a to approach that of the base oil at the higher rates of shear. Variations of η_a with rate of shear are also given for two types of thickened products and their base oil, the latter being unaffected. This effect is shown over a wide temp. range. At high rates of shear η_a may be 10% $<$ is indicated by commercial viscosimeters. The measurement is of importance in examining oils the η index of which has been improved by addition of small amounts of other substances.

H. C. R.

Molecular forces in friction and boundary lubrication. N. K. ADAM (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group IV, 1—5).—A description of the conditions in the surface layer in dry metallic contact, fluid and boundary conditions as revealed by the work of Hardy, Langmuir, etc. There is evidence that the mols. in the boundary film of lubricant are flexible so that they function as a yielding cushion, preventing the projections on one surface from hitting those on the other. The mols. of a boundary lubricant should have a high resistance to being driven or boiled off the surface. Graphite dispersed in oil is valuable as a boundary lubricant.

H. C. R.

Swedish practice in the standardisation of lubricating oils. E. NORLIN (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Suppl., 45—51).—Oils are classified according to η (centistokes at 50°) with a prefixed letter indicating use, there being 15 categories. So far the system has been mainly applied to internal-combustion engine oils. In addition to η , flash and pour points, Conradson coke residue, asphalt, and Sligh oxidation no. are included in specifications. Classification and standardisation are being carried out by a Committee of the Swedish Association of Engineers and Architects.

H. C. R.

Principles of the testing of lubricants in the laboratory and on the test bed. A. VON PHILIPPOVITCH (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Suppl., 52—57).—The difficulties of correlating service tests, engine tests on the test bed, single-cylinder engine tests, results with small test engines, and laboratory tests are outlined. By careful choice of conditions, the same results can be obtained in small single-cylinder engines as in large ones, but only when a definite characteristic of the oil is being examined. By altering the conditions of test the appropriate relations with other engines can usually be covered. The chief conditions to be controlled are pressure, temp., speed, dispersion, and catalytic effects of metals. For ring-sticking a whole range of temp. and speeds should be examined. In laboratory tests the factors time and temp. can easily be varied and a diagram of laboratory oil behaviour obtained which can be compared with that of the oil in various

types of engine. All the above methods of testing are still necessary.

H. C. R.

Laboratory tests for the study of the ageing of lubricants. MOUTTE, DIXMIER, and LION (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group IV, 151—156).—As a result of the examination of products insol. in CHCl_3 from oils used in engines and from those artificially aged it is concluded that no method is yet available for giving artificially products identical with those in used oils. A method is, however, described involving alternate heating at 100—140° and 300—400° (heating at the lower temp. being the more prolonged) which makes it possible to distinguish oils which have a strong tendency to form deposits. The O content of the CHCl_3 -insol. portion of the deposit from used oils is >20%, whereas that from artificially aged oils seldom exceeds 11%.

H. C. R.

Influence of water on the lubricating value of a commercial motor oil. A. FOGG and C. JAKEMAN (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group II, 74—79).—Experiments on a National Physical Laboratory journal-friction machine showed that the seizing temp. is lowered and the min. friction increased by >0.01% of H_2O in the oil; 0.02% deteriorated the condition of the running surfaces. The friction-temp. curve is unaffected by amounts of H_2O up to 0.05% and such quantities cannot be detected by any increase in the coeff. of friction as determined in the Deeley testing machine.

H. C. R.

Effect of a number of added substances on the lubricating properties of oils. H. W. BROWNSDON (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group IV, 58—64).—The effect of additions to a mineral oil on the wear of 70:30 brass when in frictional contact with a hardened steel wheel in the author's apparatus (cf. B., 1936, 279) is given. Certain substances, e.g., acidic substances, reducing agents, volatile substances (gases), S, Cl_2 , and their compounds, cause a marked reduction in wear even when >1% is present. No single characteristic of these substances can be put forward as the cause of their behaviour.

H. C. R.

Metallic soaps in lubricants. E. A. EVANS and A. L. KELMAN (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group IV, 90—99).—In laboratory tests, addition of small amounts of metallic soaps accelerated oil oxidation. Oleates of Sn and Cr had a small effect compared with those of Fe and Cu. Na oleate causes a greater increase in η than α the amount of soap present. Some metallic soaps were, however, found to inhibit the catalytic effect of Fe filings on oil oxidation. The max. inhibitory effect of Sn oleate was at 0.25%; Cr and Tl oleates also showed this property. Further tests on a single-cylinder petrol engine gave results not entirely in accord with the laboratory test, but showing a marked effect with mixtures of Sn and Cr oleates at a max. with 0.1% and 0.4—0.8%, respectively.

H. C. R.

Chemical constituents of paraffin-base lubricating oils. J. MÜLLER and E. NEYMAN-PILAT (J. Inst. Petroleum Tech., 1937, 23, 669—678).—Lubricating oil fractions treated by selective extrac-

tion and crystallisation at low temp. give a mixture of hydrocarbons which by hydrogenation is shown to contain a proportion of isoparaffins, which is, however, <5% and too small to influence the lubricating properties. d_4^{20} , n_D^{20} , mol. wt., $[R_L]_D$, and elementary composition are recorded for the oils and the fractions.

F. R. G.

Adsorption of oils in relation to lubrication. J. J. TRILLAT (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group IV, 196—206).—Experiments are described which show the occurrence of selective adsorption by metals and other materials of certain mols. normally present in or added to lubricants. Light is thrown on the mechanism of absorption and it was found possible to measure the approx. thickness of the boundary film and in certain cases to bring about the selection of given mols. or to measure the surface of adsorbents. The method provides a new and very delicate means of defining the quality of an oil with regard to its activity or oiliness.

H. C. R.

Study of wear and lubrication by electron diffraction. G. I. FINCH and F. D. ZAHORBUX (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group IV, 100—106).—Unlike X-rays, electrons, owing to their charge, are so easily deflected by the atoms in any matter on which they impinge that their penetration is limited to the surface layers. The patterns in the detail of a photographic record of a beam of electrons that has glanced off a surface are therefore determined by the arrangement of the atoms in the surface layer. Typical patterns are given of cryst., liquid, and amorphous surfaces and those due to long-chain hydrocarbon oil mols. standing vertically on the surface grazed by an electron beam. The val. of the graphite in cast Fe, or added to the lubricating oil, in preventing seizure when the boundary film breaks down is emphasised by this method of surface investigation.

H. C. R.

Lubrication under high-temperature conditions with reference to the use of colloidal graphite. H. HIGINBOTHAM (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group II, 89—95).—Colloidal graphite is of advantage as an adjunct to lubricating oil when boundary conditions of lubrication are approached. Electron and X-ray diffraction patterns indicate a laminated orientation of the graphite on the metal surface. Wear tests on large fleets of motor vehicles show marked decreases where colloidal graphite is added to petrol and lubricating oil. It is also proving of considerable val. in lubricating high-speed steam engines.

H. C. R.

Physico-chemical principles involved in the technology of colloidal graphite[—oil] suspensions. L. V. LIUTIN (Trans. All-Union Sci. Res. Inst. Econ. Min. U.S.S.R., 1935, No. 73, 5—43; cf. B., 1935, 392).—Graphite particles adsorb lyophilic colloids, semi-colloids, and surface-active compounds irreversibly. Some colloids (e.g., gum arabic, lignin-sulphonic acid) are adsorbed normally, but with most colloids (tannin, proteins, etc.) adsorption increases with time and temp. In C_6H_6 and similar non-polar media graphite forms strongly aggregative systems through adsorption of lyophilic colloids. In heavy hydrocarbon media the best stabilisers

are petroleum resins insol in COMe_2 . Graphite suspensions stabilised by resins and soaps coagulate from such media in presence of traces of H_2O , whilst those stabilised by rubber do not coagulate.

CH. ABS. (e)

Aero-engine lubrication and the performance of modern oils. O. T. JONES and E. E. TURNER (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group II, 100—106).—The advance in quality of aero-engine oils which has been called for since 1929 is illustrated by typical specifications and references to National Physical Laboratory journal-seizure and oxidation tests and the behaviour of oils in 100-hr. tests in modern aero-engines. Photographs of the engine parts after test are shown. H. C. R.

Cylinder lubrication of small-bore Diesel engines. C. G. A. ROSEN (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group II, 169—177).—Experiments on a single-cylinder Diesel test-engine with a variety of lubricants are described with particular reference to ring-sticking phenomena, tests carried on until the "blow-by" of gases reached vals. of 85 cu. ft./hr. indicating serious ring-sticking. Naphthenic-base oils showed the longest service under normal conditions, paraffinic oils under high-temp. conditions. Mildly solvent- or acid-treated oils were better than severely treated oils. The use of compounded oils facilitates copious lubrication without the attendant formation of gummy deposits. H. C. R.

Oxidation behaviour of internal-combustion engine lubricants. E. W. J. MARDLES and J. E. RAMSBOTTOM (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group II, 119—131).—A series of oils was oxidised at 125° to $>225^\circ$ (a) by heating in open dishes (glass and metal), (b) by bubbling a stream of air or O_2 through a column of the heated oil, (c) by heating isothermally on the walls of a rotating bulb, and (d) by passing the vapour or spray mixed with air through a heated tube. The rate of absorption of O_2 in a closed system was also measured. The results of the examination of a no. of oils after these various treatments are given in a series of tables and curves. Whilst the different conditions affected oils of varying origin differently, the oils were placed in the same general order by all the methods applied. H. C. R.

Influence of catalysts on oxidation of oils. T. K. HANSON and A. C. EGERTON (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group IV, 122—127).—Experiments prove that the rate of absorption of O_2 by oils at 220° is greatly influenced by the presence of NO_2 in concns. present in the engine cylinder. Different oils behave differently in presence of NO_2 . The effect is to shorten the induction period, so that the presence of this gas may explain the rapid deterioration of the oil which occurs when once gumming starts, and the increased tendency to gum under knocking conditions as the $[\text{NO}_2]$ is thereby increased. This may also be a reason why engine tests on oils give such very different results under different conditions. H. C. R.

Oxidation tests for motor oils. B. H. MOORBEEK (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group IV, 146—150).—A criticism of the

general val. of these tests for judging the merits of oils for internal-combustion engines. H. C. R.

Alteration of lubricating oil during use in internal-combustion engines. C. H. BARTON (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group II, 10—16).—The unreliability of laboratory oxidation tests on lubricating oils as a guide to their behaviour in service is illustrated by the results of the Indiana and the British Air Ministry tests on four oils which are rated in entirely different orders by the two tests. Experiments show the marked effect of a high oil consumption in increasing the rate of deterioration of the lubricant. The effect is usually masked in practice by the frequent additions of fresh oil. H. C. R.

Service effects on lubricating oil. A. E. FLOWERS (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group II, 66—73).—The results of several years' observation of the change in the character of Diesel engine and geared steam-turbine lubricating oils with use are given in the form of graphs, and the effects are discussed. H. C. R.

Sludge and deposits in turbine oils. W. O. ANDREWS (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group IV, 6—12).—Two kinds of deposit are found, one dark brown and forming a thick slime or varnish, the other a spongy sludge consisting of H_2O emulsion. An emulsifying test is described which has been found useful in judging the condition of used oils and an accelerated ageing test comprising heating the oil to 150° in contact with polished Cu for 1 and 6 hr., filtering off the deposit, and measuring the rate of separation from emulsion after the test. The test correlates well with experience in turbines over a no. of years, and oils are found to be satisfactory if little sludge is shown and separation occurs at a rate of <50 mm./hr. after a 6-hr. test. H. C. R.

[Lubricating] oil reclamation and the use of reclaimed oil. A. BEALE (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group II, 24—28).—The various possible methods of reclaiming oil are reviewed and the advantages and disadvantages outlined. By-pass filtration is usually the best method in practice. H. C. R.

Technique of machine lubrication by oils and greases. E. HEIDEBROEK (Angew. Chem., 1937, 50, 743—747).—The lubrication of journals and bearings is considered from a theoretical and mathematical viewpoint. It is concluded that much lighter oils can be used successfully both in the case of fluid and boundary lubrication conditions. C. C.

Testing of ball-bearing greases. B. KJERRMAN (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group IV, 133—137).—For all kinds of ball-bearing greases it is necessary to know the starting drop point, the drop point, ash and Cl content, and the amount and nature of foreign particles. Running tests should be made under conditions corresponding as closely as possible with the working conditions. For Cu-soap greases a penetration test may be used. Alkali greases may be examined for their power to form an emulsion which protects against rust. H. C. R.

Lubrication of synthetic-resin-bonded bearings. P. BEUERLEIN (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group I, 8—16).—Among greases a Ca soap and other metallic soap greases containing oil of high η gave the best protection. The shrinkage due to oils is very small and the results of 12 different types of oils were inconclusive. H. C. R.

Lubrication of journal bearings with water-base lubricant. F. SAMUELSON (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group I, 240—247).—The successful lubrication of steam-turbine bearings with H_2O containing 2% of sol. oil and bearing tests on this lubricant are described. Power losses at 6000 r.p.m. were halved as against oil lubrication, and journal and bearing surfaces were quite normal after a 120-hr. endurance test. This method of lubrication avoids serious fire risks with high-temp. steam-turbine lubrication. H. C. R.

Practical considerations of lubrication and lubricants in regard to antifricition bearings. T. W. COOPER (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group III, 36—42).—Types of oil and grease suitable for lubricating ball bearings, and their methods of application, are discussed. Details of design for maintaining a supply of lubricant and methods of testing oils and greases for this purpose are outlined. H. C. R.

Influence of pressure on film viscosity in heavily loaded bearings. S. J. NEEDS (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group I, 198—204).—Up to 20,000 lb./sq. in., $\log \eta$ plotted against pressure gives nearly a straight line for castor oil at 39°. Curves are given for the variation of coeff. of friction with load for a paraffinic mineral oil, castor oil, and glycerol. The vals. pass through a min. at high pressure and are very low. Oiliness may be due simply to differences in the η -pressure relation for different oils, but this would not explain differences in static friction between oils. H. C. R.

Relationship of the pressure-viscosity effect to bearing performance. L. J. BRADFORD and C. G. VANDERGRIFT (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group I, 23—29).—The pressure- η relation appears to be fully as important as the temp.- η relation and it holds out the possibility of bearings of extremely high capacity that still operate under fluid conditions. For this both bearing and journal must be very smoothly finished and so mounted as to permit formation of a film convergent in the direction of motion. Frictional heat should also be removed as soon as formed. The lubricant for a high-capacity bearing should have a large pressure- η effect combined with a small temp.- η effect. H. C. R.

Re-examination of the hydrodynamic theory of bearing lubrication. L. PRANDTL (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group I, 223—230).—Tests conducted with the author's bearing-testing apparatus proved that the above theory gives fully correct results provided the entry of air into the bearing is prevented. Otherwise a layer of air between the oil film on the journal and

bearing brass will considerably reduce the thickness of the oil film. H. C. R.

Extreme-pressure lubricants and lubrication. F. L. MILLER (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group III, 102—112).—The properties demanded of these lubricants are listed and the load-carrying capacities of the five common types as tested on the S.A.E., Almen, Mougey, and Timken machines are given. Of the 70 lubricants which passed the gear-scoring tests with Chevrolet cars and hypoid axles, 62 were of the Pb soap-active S type. A loss of extreme-pressure properties frequently occurs under conditions of use, the Cl content of lubricants of the S-Cl type falling off. Properly made active Pb-S types do not lose their properties even after long use. Wear data are given for ball bearings in a modified Timken machine. The effect of heating on η depends on the quality of the mineral oil used. Sulphide and chloride films form on the gear-tooth surfaces. In presence of moisture the former show little tendency to react, but the latter react readily forming abrasive products. Tests for channelling and foaming are employed. H. C. R.

Experimental study of lubrication under conditions of extreme pressure. J. E. SOUTH-COMBE, J. H. WELLS, and J. H. WATERS (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group IV, 172—183).—The results of wear experiments, using the Timken machine, and of measurements of the effect of temp. on the coeff. of friction are given for a range of oils including typical extreme-pressure lubricants. In no case was an average pressure of 17,000 lb./sq. in. exceeded. As soon as the loading approaches this figure either seizure occurs or relief is found by wear. The authors conclude that "high film strength" does not exist and that an extreme-pressure lubricant must be defined as one which permits the metal to wear away smoothly when the pressure intensity approaches a certain limiting val. Curves are given showing relations between load and scar area, rate of wear, and the effect of load on wear after running for 1 hr., of speed on wear after 10 min. running, and of load on wear at various temp. for the oils tested. Relations between temp. and coeff. of friction are also given. H. C. R.

Characteristics of gear lubricants revealed by the four-ball extreme-pressure lubricant-testing apparatus. D. CLAYTON (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group III, 27—35).—In tests of the seizure characteristics under conditions of high pressure between hard steel balls, the order of increasing quality as regards breakdown load and wear with seizure is: (a) ordinary mineral oils, (b) oils containing ZnO and castor oil, and (c) extreme-pressure lubricants. The time to recovery from seizure, which is probably related to wear, is long (20—60 sec.) with (a), intermediate (3—6 sec.) with (b), and very short (1—2 sec.) with (c). A moderately refined mineral oil had a breakdown load and wear of about the same order as castor oil. H. C. R.

Comparison of the behaviour of various extreme-pressure lubricants in different testing machines. J. L. VAN DER MINNE (Inst. Mech.

Eng., Lubrication discussion, Oct., 1937, Group IV, 207—219).—The four-ball, Timken, Floyd, and S.A.E. testers are described and their essential parts illustrated. The salient characteristics of their demands on oils are discussed and tabulated, and the results of testing eight lubricants representing the principal types of extreme-pressure lubricant, fatty and mineral oils on all four machines are given. The remarkable difference in rating obtained suggests that there are two ways in which non-fluid lubrication may be effected: (a) chemical attack on the surface at the points where, owing to high pressure, high sliding velocity, and great generation of heat, the temp. has risen, chemical reaction is accelerated, and the formation of reaction products prevents welding together of moving parts, and (b) an adsorption of polar compounds at the surface as a result of which the coeff. of friction remains low and there is less generation of heat. Oiliness does not seem to improve lubrication at high speed and pressure, and possible reasons for this are advanced. All the above testers are less exacting as regards pressure and sliding velocity than is the hypoid gear. H. C. R.

Cutting fluids. O. W. BOSTON (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group III, 14—20).—Properties required of cutting fluids are summarised. Measurements of the performance of a series of 11 different fluids, including sol. oils, compounded mineral oils, sulphurised mineral oils, and a sulphurised lard-mineral oil blend, were made under standard conditions by measuring torque and thrust when cutting a variety of metals. The influence of tool design on cutting force with the above fluids was also studied. The lubricating val. of these fluids was tested on a bearing-testing machine. The S in straight mineral oil permits the generation of considerable friction and heat, but prevents seizure, whereas the inclusion of sulphurised lard oil reduces the friction without preventing seizure. Cutting speeds for a 60-min. tool life, measured under standard conditions, are given for a variety of fluids. H. C. R.

Application of cutting fluids. J. F. MILLER (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group III, 113—118).—A general review of modern practice in the utilisation of these fluids. H. C. R.

Cutting fluids and cooling oils in machine tools. A. H. LLOYD and H. H. BEENY (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group III, 84—89).—An account is given of experience with various cutting fluids in works using high-speed tools. H. C. R.

Lubrication in wire-drawing. R. GOODACRE (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group III, 61—67).—Equations are given connecting power consumption, angle of die, and coeff. of friction. Up to 50% of the energy used may be lost through friction in the die. The nature of lubrication during wire-drawing is discussed. Boundary conditions are probable, but fluid lubrication may occur under certain conditions. The dry-drawing of Fe and steel wire, using dry soap as lubricant, is a special case the mechanism of which is still obscure. H. C. R.

Problem of oiliness. S. KYROPOULOS (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group IV, 138—145).—Oiliness is best studied by examining, on a broader basis, the physico-chemical properties of the oils concerned and the mol. forces involved, and applying the available knowledge from these fields of research in constructing working hypotheses and planning experiments. Oiliness research, as it had developed from engineering work during the last 15 years, sometimes showed a tendency to develop a physical chemistry of its own, disregarding well-established experience and theories of physical chemistry. H. C. R.

Oiliness in relation to viscosity. A. W. BURWELL and J. A. CAMELFORD (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group IV, 65—78).—The behaviour of lubricating oil films was studied under controlled conditions of pressure, bearing temp., journal speed, and oil supply in a modified Moore-Carvin friction machine (diagram given). Coeff. of friction, pressure, and temp. curves are given for oils with and without the addition of oiliness compounds and before and after subjecting the oil to the action of a large surface of metal powder, which was shown to adsorb appreciable amounts of polar mols. It is concluded that the composition of the lubricating film is not identical with that of the oil mass. Variations in refining practice cause wide differences in the friction properties of lubricants and valuable information will be gained from detailed experimental investigation of pressure, temp., η relations, and of the forces of attraction between polar substances and bearing metals. H. C. R.

Use of the four-ball extreme-pressure lubricant-testing apparatus for ordinary lubricants. D. CLAYTON (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group IV, 79—89).—It appears that oiliness properties are being tested as there is no formation of a load-carrying film. The order of increasing quality is as for gear lubricants. Glycerol has intermediate properties, whilst syrup behaves like an extreme-pressure lubricant. Moderately refined mineral oil behaved in some respects like a fatty oil. Addition of colloidal graphite or small amounts of H_2O to a mineral oil reduced quality slightly, but larger amounts of H_2O , oleic acid, and rape oil improved it. H. C. R.

Oil viscosity in relation to cylinder wear. C. G. WILLIAMS (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group II, 198—204).—Cylinder-wear measurements were made under a variety of conditions including frequent stopping and starting and continuous cold-running, using four oils of widely differing η . Measurements were also made of the time taken from starting up before a satisfactory oil film was formed between piston and cylinder (as shown by voltage measurements in an electric circuit comprising piston and cylinder block). Oils of very low η showed slightly greater cylinder wear, especially under continuous cold-running, but considerable superiority in the time taken to establish the oil film at the piston/cylinder interface. H. C. R.

Viscosimetry as applied to petroleum products in the United States. J. C. GENESSE (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group IV, 113—121).—An account of the work of Committee D2 of the A.S.T.M. in introducing the suspended-level and the modified Ostwald viscosimeters as tentative standards which it is hoped will ultimately displace the Saybolt Universal viscosimeter. Formulæ and tables for the conversion of centistokes into Saybolt sec. are given. The A.S.T.M. η -temp. charts are described and steps have been taken to standardise the Saybolt scale in terms of η for H_2O .

H. C. R.

Graphical solutions of viscosity problems. J. GROFF (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Suppl., 37—44).—A new chart is described which enables η to be readily transposed into other units at other temp. and η index, properties and proportions of blends, S.A.E. nos., Ubbelohde pole heights, and η -temp. indices to be read off if η at two temp. is known. A specimen of the chart and full instructions as to its use are given. H. C. R.

Petroleum wax. I. Determination and analysis of wax. II. Composition of waxes. D. S. MCKITTRICK, H. J. HENRIQUES, and H. I. WOLFF (J. Inst. Petroleum Tech., 1937, 23, 616—627, 628—641).—I. Wax in oil (or oil in wax) is determined by crystallising from $C_2H_4Cl_2$ or $CHCl_3$ at -35° or -55° , respectively, in a special apparatus (described). Various wax fractions can be separated and examined by separating the wax at successive temp. The use of 75 ml. of solvent per g. of oil is satisfactory. Asphalt has no appreciable effect on the result. The $C_2H_4Cl_2$ method, in contrast to the Holde method, removes low- as well as high-melting waxes. $CHCl_3$ is preferable to $C_2H_4Cl_2$ for very paraffinic oils. A 50/50 mixture of $C_2H_4Cl_2$ and PhMe gives less wax than pure $C_2H_4Cl_2$ or $CHCl_3$. Clean separation of oil from low-melting wax is not possible with the mixed solvent. $C_2H_4Cl_2$ gave sharper separation of the wax fractions than either of the other solvents.

II. Physical properties of 95 pure hydrocarbons are tabulated. Wax fractions can be conveniently characterised by the m.p. and n_D^{20} . Curves are given showing the relation between the m.p. and n_D^{20} of pure hydrocarbons and for fractions of a no. of distillate waxes. It is considered that high-melting waxes consist chiefly of normal paraffins, whereas in fractions with successively lower m.p., isoparaffins, naphthenes, and aromatics may predominate. The higher-melting fractions of residue waxes are not chiefly *n*-paraffins, but contain non-paraffins. Eastern, Mid-continent, and Western American crudes differ considerably, but the distillate waxes are similar. Residue waxes differ and show characters related to the parent crudes. Petrolatums were shown to be mixtures of moderately hard waxes and oils of low pour point. The higher-melting fractions appear to be naphthenes.

C. C.

Erratum:—On p. 204, col. 1, line 5 of B abstracts, 1937, for "Distillation . . . oil" read "Raisin (grape) seeds from distilled or undistilled marc yield 10—15% of an oil."

World power development. Separation by frothing.—See I. Pure CH_4 from natural gas. **Oxidation of CH_4 . AcOH from C_2H_4 . Styrene from petroleum pyrolysis products.**—See III. **Inactivation of NH_3 catalysts.**—See VII. **C_3H_8 as glass-plant fuel. Coke-oven liners.**—See VIII. **Testing bituminous surfacings. Coal-mine timber.**—See IX. **Piston rings etc.**—See X. **Lubricants.**—See XII. **Plastics from peat. Tar varnishes etc.**—See XIII.

See also A., II, 479, Reaction for unsaturated hydrocarbons or their peroxides. 489, Sulpho-naphthenic acids.

PATENTS.

Coal separator. F. C. WRIGHT, jun., Assr. to PENN ANTHRACITE COLLIERIES CO. (U.S.P. 2,058,374, 20.10.36. Appl., 27.5.35).—A sand-pulp separating vessel with agitator to maintain the suspension is described.

B. M. V.

Production of fuel briquettes. L. E. JONES. From H. C. HAY (B.P. 473,033, 3.6.36).—Coal is crushed, heated to 95 — 320° (95 — 150°), and mixed with 3—8% of "Bunker C fuel oil" or fuel oil (*d* approx. 0.95) and when well mixed is macerated in presence of live steam. Maceration is continued until sufficient of the spore cases of the coal have been broken up and their resinous contents extracted by the oil to form a solution capable of functioning as an efficient briquette binder. The mix is then cooled to 65° and pressed.

H. C. M.

Improving the combustion of coal of low calorific value. F. ESKE and C. A. SCHEPERS (B.P. 469,799, 1.11.35. Ger., 1.11.34).—A method for utilising the distillation gases ("rich gases") produced in a furnace is described, whereby the efficiency of the furnace is considerably increased. The rich gases are collected immediately following their formation above the fuel bed in the furnace and are conducted without making contact with the heat-discharging walls of the furnace into a mixing chamber of construction independent from that of the furnace, where they are mixed with gases taken from the flue, the gas mixture then being returned to the combustion zone of the furnace. Apparatus is claimed.

H. C. M.

(A) Apparatus for producing fuel. (B) Production of fuel. J. N. VANDEGRIFT and C. POSTEL, Assrs. to COAL PRODUCTS CO. OF DELAWARE (U.S.P. 2,066,082—3, 29.12.36. Appl., [A] 11.2.32, [B] 10.5.33).—Smokeless fuel is produced from slack by distillation at 760° in vertical cylindrical retorts charged from tubes in which the coal is preheated to remove H_2O . After about 1 hr. at 760° the material, which has now only 4—10% of volatile matter, is dumped and cooled out of contact with air. During the distillation the material is kept under pressure by the wt. of pistons resting on top of the charge in each retort.

D. M. M.

Coke ovens. W. W. GROVES. From DR. C. OTTO & Co. G.M.B.H. (B.P. 473,518, 19.1.37).—In under-burning coke ovens having vertical rich-gas ducts in the refractory masonry communicating with feed pipes which enter openings in the concrete

plate on which the masonry of the oven rests, these openings are so placed (or so shaped) as to allow for the different expansions of the plate and superposed masonry so that they register with the ducts after the oven has attained its working temp., when the feed-pipes are introduced. Alternatively, the lower ends of the ducts may be elongated in the longitudinal direction of the oven by an amount corresponding with the expansion.

A. B. M.

Coke ovens. DR. C. OTTO & Co. G.M.B.H. (B.P. 474,331, 18.1.37. Ger., 2.11.36).—The supporting plate which carries the oven structure is provided with expansion gaps extending transversely to the longitudinal direction of the battery and spaced further apart than the supporting pillars. The gaps may be placed above a row of pillars or between two closely adjacent rows of pillars. The supporting plate may rest on the pillars through slidable bearing members, *e.g.*, metal plates. The gaps may be filled with compressible material, *e.g.*, sand.

A. B. M.

Heat-regenerating coke oven heated by gas from blast furnaces or from gas generators. Soc. GÉN. DE FOURS À COKE, SYSTÈMES LECOQC, Soc. ANON (B.P. 474,316, 1.10.36. Belg., 22.10.35).—The heating walls of the oven comprise vertical flues arranged in groups; below the heating walls are regenerators arranged in longitudinal rows separated by continuous walls which support the superstructure. The regenerators in one row are traversed either by air to be heated or by waste gases, whilst those in the adjacent rows are traversed either by gas to be heated or by waste gases. The regenerator of the terminal group which is nearest to the air- or gas-supply valves is connected to the latter by means of a separate conduit provided with an easily accessible control valve permitting accurate control of the air or gas admitted to the corresponding flues. The groups of cooling regenerators are separated from the groups of heating regenerators by thick walls parallel to the axis of the battery. The arrangement permits adequate combustion control and minimises loss due to leakage of gas.

A. B. M.

Coking apparatus. J. V. MEIGS, Assr. to BARRETT Co. (U.S.P. 2,064,484, 15.12.36. Appl., 27.4.29. Renewed 8.6.34).—Pitch is coked in narrow horizontal or elongated upright coking chambers communicating with each other through a wide top space to enable the foaming which occurs to carry over pitch from a full oven to an empty or less full one.

D. M. M.

Coking of coal. C. OTTO (U.S.P. 2,065,288, 22.12.36. Appl., 1.7.31. Ger., 1.7.30).—In carbonising coal at $>500^{\circ}$ in intermittent-type coke ovens, the distillation gases are drawn off by suction during the first period of the distillation through passages extending into the interior of the charge, scavenging gases being also admitted during the first period of the charge, these gases being derived from the last period or from the steaming period of another oven.

D. M. M.

Carbonisation. G. W. WALLACE (B.P. 473,187—8, 3.4.36).—(A) Coal is fed as a thin (2.5—4.5 in.) layer on to a (chain-grate or metal-apron) conveyor which is then passed either continuously or inter-

mittently, there being no relative movement between the coal and the conveyor, through a coking chamber in countercurrent to a flow of hot gases, low- or medium-temp. carbonisation being thereby effected. The hot gases are obtained by combustion of the distillation gases produced in the process and/or of producer gas with an insufficiency of air. (B) A thicker layer of coal is used, *e.g.*, 6—24 in. (12—18 in.), and the hot combustion products are passed in regulated amounts downwards at different points along the layer of coal, the distillation gases being collected from below the coal layer.

H. C. M.

Vertical carbonising retorts. WOODALL-DUCKHAM (1920), LTD., A. T. KENT, and H. H. CAREY (B.P. 474,792, 12.5.36. Addn. to B.P. 357,146; B., 1931, 1129).—The descent of the charge in the retort is regulated by discharging the coke into a coke-measuring chamber of adjustable capacity. The chamber is separate from the retort and can also serve as a skip for removing the discharged coke.

A. B. M.

Carbonisation of coal or like carbonaceous materials. A. R. GRIGGS (B.P. 469,607, 28.12.35).—Coal etc. is heated at, *e.g.*, 600 — 650° by the downward passage through it of diluted hot products of the substantially complete combustion of enough gas to provide the amount of heat in thermal units required for carbonisation. The combustion takes place in an adjoining chamber, and just before passing through the charge the hot products of combustion are mixed with enough excess gas to lower their temp. sufficiently to prevent over-heating of any of the charge.

D. M. M.

Carbonisation of coal and like carbonaceous materials. A. R. GRIGGS (B.P. 469,834, 24.2.36).—Carbonisation of the coal is effected in internally heated retorts by continuous circulation therethrough of the gases produced during distillation and the products of combustion of some or all of the distillation gases. The hot carbonised residue is then dry-cooled in a separate closable chamber, thereby leaving the retort free for recharging and carbonising, by circulating through the hot coke a mixture of cooled distillation and combustion gases. These heated gases are then made to undergo complete or partial combustion and the resultant hot gases are passed through the recharged retort, combustion and circulation being continued until carbonisation is completed. Apparatus is claimed.

H. C. M.

Distillation and coking of mixtures of solid carbonaceous materials with hydrocarbon oils. J. SWALLOW (B.P. 473,886, 20.3.36. Cf. B.P. 393,601—2 and 413,927; B., 1933, 738; 1934, 916).—A mixture of finely-divided coal with oil is passed through a coil still, the velocity and temp. (300 — 400°) in which are such as to effect a partial dissolution and cracking of the hydrocarbon constituents of the coal without causing caking in the tube, and thence into an externally-heated, inclined, rotary retort in which the material is coked at about 450° . The volatile products are withdrawn from the inlet end of the retort, and are condensed in stages, the first stage (condenser temp. 200°) giving an oil suitable for preparing further quantities of the coal-oil

mixture. The formation of lumps of undue size during the coking process is prevented, and the walls of the retort are kept clean, by means of spiked skeleton cylinders freely suspended on a central rod within the retort.

A. B. M.

Production of active carbons from coal. J. G. KING (B.P. 474,237, 27.4.36).—Hard, dull coals or durains rich in plant remains are carbonised at $>600^{\circ}$ ($450\text{--}500^{\circ}$) and the coke is activated by treatment with steam at $900\text{--}1000^{\circ}$ until the wt. of each piece is reduced by 70—80%. Caking coals may be pre-treated, *e.g.*, oxidised, to reduce their caking power before carbonisation.

A. B. M.

Carbon black. W. H. GROTE, Assr. to UNITED CARBON CO., INC. (U.S.P. 2,066,274, 29.12.36. Appl., 19.1.34).—The oil-adsorption factor of C black is reduced without affecting its colour val. by prolonged attrition, *e.g.*, in a ball mill with steel balls, a non-oxidising atm. at, *e.g.*, $205\text{--}475^{\circ}$ being maintained.

D. M. M.

Manufacture of aggregates of carbon black. H. J. GLAXNER, Assr. to COLUMBIAN CARBON CO. (U.S.P. 2,065,371, 22.12.36. Appl., 6.11.33).—C-black aggregates (average diameter 0.0005 in.) free from occluded gases are made by mixing approx. equal quantities of H_2O and C black to a paste and progressively advancing the mass along an elongated path, the aggregates being formed by the action of numerous impacts caused by small agitators moving across the line of advance of the mass.

D. M. M.

Treatment of carbon, carbonaceous material such as coal and the like, and organic carbon compounds. GEWERKSCHAFT AUGUSTE (B.P. 473,651, 14.4.36. Ger., 26.4., 21.5., and 27.7.35).—Interaction, if desired in presence of catalysts, of CH_4 or gaseous mixtures containing CH_4 and C or other org. compounds, *e.g.*, mono- or poly-hydric alcohols, phenols, org. acids, cotton, rubber, coal or wood tars, petroleum fractions, at $<390^{\circ}$ and under sufficient pressure to polarise CH_4 (>500 atm., or when C_2H_4 or C_2H_2 is present in the gases >250 atm.) gives hydrocarbons. The proportions of the reactants are such that the free energies of the conversion reactions are <5000 g.-cal./mol. of product, the reaction preferably being carried out in a heterogeneous system the liquid phase of which may be provided, if necessary, by additional substances, *e.g.*, paraffins, vaselines. Examples are the prep. of benzenes from paraffin oil, $(\text{CH}_2\cdot\text{OH})_2$, CO, EtOH, C_2H_2 , glycerin, or $\text{CH}_2\cdot\text{CH}\cdot\text{CH}_2\cdot\text{OH}$, of C_6H_6 , PhMe, and benzene from C_{10}H_8 , of PhMe from PhOH, and of C_6H_6 , PhMe, xylene, and mesitylene from pyrogallol.

N. H. H.

Heat-treatment of liquid and solid fuels and like distillable materials. F. KRUPP A.-G. (B.P. 472,457, 18.11.36. Ger., 5.12.35).—Distillation apparatus made of mild or cast steel can be employed at $>500^{\circ}$ if the wall thickness of the heated parts is $<$ twice that required to withstand the purely mechanical stresses when calc. with a safety factor of 5. Resistance to corrosion and scaling can be further increased by the use of a mild steel containing $>0.04\%$ C. Suitable apparatus is claimed.

H. C. M.

Destructive hydrogenation of solid carbonaceous materials. S. FUJIKAWA (B.P. 473,107, 17.10.36).—The coal is first converted into a substantially colloidal paste by pulverisation with H_2O , in which form it is then pumped under high pressure, *e.g.*, 250 atm., through a drying autoclave, heated externally to $350\text{--}380^{\circ}$, wherein it is dried by a countercurrent stream of heated, high-pressure circulating H_2 , the dried material, after preheating to $380\text{--}400^{\circ}$, then being charged into the reaction vessel. The passage of the coal from the dryer, through the preheater, and into the reaction vessel may be effected by screw conveyors.

H. C. M.

Production of valuable, in particular high-boiling, hydrocarbons from solid carbonaceous materials by destructive hydrogenation. INTERNAT. HYDROGENATION PATENTS CO., LTD., Asses. to I. G. FARBENIND. A.-G. (B.P. 472,354, 11.9.36. Ger., 15.1.36).—By pasting the solid carbonaceous material with (0.2—4 pts. of) an oil having an upper b.p. of 300° , residues from a previous hydrogenation and containing unconverted coal, ash, etc. can be recycled to the initial material without disadvantage. Catalysts [*e.g.*, $(\text{NH}_4)_2\text{MoO}_4$] may be employed in the process.

H. C. M.

Splitting and destructive hydrogenation of carbonaceous substances. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 473,082, 28.4.36).—Catalyst carriers having a marked catalytic action on such reactions are obtained by coking at $600\text{--}1000^{\circ}$ (900°) the pressure-extraction products of solid carbonaceous materials, *e.g.*, coal or peat, which have been substantially freed from ash and other insol. coal constituents. The extraction may be effected with, *e.g.*, cresol or tetrahydronaphthalene at $300\text{--}500^{\circ}/50\text{--}500$ atm. The activity of these carriers can be further increased by activation with steam at 950° , and/or impregnation with a solution of a suitable catalyst, *e.g.*, ZnCl_2 , MoO_3 , followed by treatment with H_2S or CS_2 at elevated temp.

H. C. M.

Destructive hydrogenation of distillable carbonaceous materials. H. E. POTTS. From INTERNAT. HYDROGENATION PATENTS CO., LTD. (B.P. 469,735, 29.1.36).—The hot liquid in the catch-pots of hydrogenation plants is agitated by pumps to the cylinders of which the catch-pots are connected by pipes of such length and internal diameter that the hot liquid does not come in contact with the pumps, but the liquid which oscillates in the pipes is practically cold near the pumps.

D. M. M.

Smoke-producing apparatus. GEN. ELECTRIC CO., LTD., A. C. BARDALOYE, and W. R. STEVENS (B.P. 472,067, 18.5.36).—Evaporation of drops of oil without combustion is effected on a surface which is heated by means other than combustion; preferably an electric resistance is used. The surface is roughened, *e.g.*, by forming the surface of gauze. The smoke is blown away by a fan producing such a strong current of air that combustion is inhibited.

B. M. V.

Continuous vertical retort for production of gas of definite composition from fuels. DIDIER-WERKE A.-G. (B.P. 470,950, 5.11.36. Ger., 3.3.36).—

The gas is withdrawn from the retort in an upward direction through one or more internal gas offtakes, formed in a hollow wall (or walls) which is (are) situated between the two end-walls or the two side-walls of the retort, respectively, and extends into the lower half of the retort, each offtake being in contact on two opposite sides with the material in the retort.

H. C. M.

Manufacture of combustible gas. W. W. ODELL (U.S.P. 2,052,149, 25.8.36. Appl., 13.6.30).—In the substantially continuous process described the solid fuel bed of a gas producer is raised to incandescence and then blown with a mixture of a gaseous hydrocarbon, air, and steam, in which the vol. of air is insufficient to effect complete combustion of the hydrocarbon, and the amount of steam is <1 mol. for each C atom of the hydrocarbon. A gas is obtained which is substantially free from suspended C resulting from hydrocarbon decomp. and consists largely of CO and H_2 .

H. C. M.

(A) Water-gas set. (B) Carburettor for carburetted water-gas sets. (C) Carburetted water-gas set. (A, B) C. H. HUGHES, (C) W. TIDY, Assrs. to SEMET-SOLVAY ENG. CORP. (U.S.P. 2,064,005—7, 15.12.36. Appl., 5.6.31).—(A) In a water-gas set consisting of generator, carburettor, and superheater in series, the latter has no chequerbrick work in its upper portion, but in its lower portion has arches of refractory material bonded with the lining and rising to a point of intersection on the axis of the vessel. The blast gases are burned in the carburettor during the blast cycle and heavy or crude oil is vaporised in the upper part of it during the run, passing down with the water-gas. (B) A carburettor constructed as in (A), but with the intersecting arches in the upper part of the carburettor immediately below the gas inlet, and the oil vaporiser in the empty lower part below the arches, is described, the oil vapours flowing countercurrent to the water-gas. In both cases the operation may comprise three cycles, viz., a "blasting cycle," an "up-run," and a "back-run." (C) A carburettor is described in which chequerbrick work is built in its upper part only, heavy oil being admitted downwards into an empty vaporising chamber below the brickwork in countercurrent to the upward passing water-gas. D. M. M.

Carburetted water-gas process. J. S. HAUG, H. G. TERZIAN, and J. A. PERRY, Assrs. to UNITED GAS IMPROVEMENT CO. (U.S.P. 2,067,052, 5.1.37. Appl., 29.8.32).—In a carburetted water-gas set, means are provided for vaporising oil at the top of the generator and at the top of the superheater in addition to the top of the carburettor. Oil may be introduced at any or all of these places simultaneously and the oil-gas streams so produced are joined; e.g., oil is vaporised at the top of the generator and superheater and the gases are passed down through each and joined to pass up through the carburettor. In this way a gas comparable with natural gas, e.g., of calorific val. 1100 B.Th.U. and d 0.65, is produced. D. M. M.

Production of water-gas free from tar and hydrocarbons from bituminous fuels. VERGASUNGS-IND. A.-G. (B.P. 473,948, 22.2.37. Austr., 2.11.36).—A generator, the upper part of which forms

a distilling zone and the lower a gasifying zone, is connected in series with a superheater. The following cycle is carried out: (a) air is blown up through the gasifying zone only, the blast gases being burned in the superheater; (b) steam, admixed with gases withdrawn from the top of the distilling zone, is passed through the superheater and thence up through the gasifying zone; (c) the same steam and gas mixture is passed down through the gasifying zone. During (b) and (c) a continuous recirculation of gas is maintained through the superheater and up through the distilling zone; in these two stages the surplus gas made is withdrawn from the top and bottom of the gasifying zone, respectively.

A. B. M.

Manufacture of gases. H. J. CARSON (U.S.P. 2,066,670, 5.1.37. Appl., 31.10.30).—The manufacture of water-gas is improved by using the waste heat of the gases to heat up the ingoing steam and blast air, while a limited, controllable amount of air is admitted with the steam at different levels to reduce the cooling effect of the steam. If bituminous fuel is used, an upper carbonising zone is provided, externally heated by the air-blast gases, with or without their secondary combustion. Slagging troubles are avoided by running off the ash and clinker-forming material as liquid slag. Gas of high H_2 content may be produced by spraying liquid hydrocarbons into the top of the generator in a downward current of highly superheated steam.

D. M. M.

Means for producing gas from tar, crude oils, and carbonaceous liquid materials. H. F. WALSHAM (B.P. 473,125, 2.3.36. Australia, 2.12.35).—Tar or other carbonaceous liquid material is discharged through a pipe fitted with an atomiser into the base of a vertical cylindrical retort which is heated externally to 900—1000° by means of producer gas. Steam is also supplied to the retort through a second pipe surrounding the tar pipe and having its outlet near to the atomiser, whereby the steam issuing therefrom impinges against the tar particles issuing from the atomiser, partial gasification of the tar being thereby obtained. Means are provided for admitting a regulatable amount of producer gas to the base of, and for withdrawing the mixed gas from the top of, the retort.

H. C. M.

Generation of acetylene gas. J. HAWORTH (B.P. 472,970, 1.4.36).—A generator of the controlled carbide-feed type is described.

B. M. V.

Recovery of acetylene from gas mixtures. R. M. ISHAM, Assr. to DANCIGER OIL & REFINERIES, INC. (U.S.P. 2,063,680, 8.12.36. Appl., 12.4.35).— C_2H_2 is recovered by countercurrent scrubbing of the gases with a selective solvent, consisting of an aliphatic lactone, e.g., butyro- or γ -valero-lactone. Pressures of 200 lb./sq. in. may be used.

D. M. M.

Pumps for circulating liquor in coal and like gas purification plant. T. O. WILTON (B.P. 473,083, 5.5.36).—A no. of pumps circulating different liquids are arranged so that their leakage returns only to the same circuit although the pumps may be on one long shaft.

B. M. V.

Gas purifiers. M. and M. KLÖNNE (A. KLÖNNE) (B.P. 474,124 and Addn. B.P. 474,125, [A] 13.2.37,

[B] 15.2.37. Ger., [A, B] 19.9.36).—(A) The solid gas-purifying mass is supported in the annular space between two vertical, perforated cylinders across which the gas passes radially. The inner cylinder is divided horizontally into a no. of superposed sections. The spent material is discharged by removing the sections in succession from top to bottom, and allowing the material to fall through the central space into a receptacle at the bottom from which it is removed by a portable conveyor. (B) The gas chamber or flue surrounding the annular chamber is subdivided into two or more compartments by horizontal partitions, each compartment having a separate inlet or outlet for the gas. A. B. M.

Desulphurising of gases. STUDIEN- U. VERWERTUNGS-GES.M.B.H. (B.P. 469,933, 30.10.35. Ger., 5.11.34).—Removal of org. S from gases containing CO and H₂ is effected in a two-stage process; in the first, the bulk of the org. combined S is decomposed catalytically at >300°, the H₂S so formed being removed at a lower temp.; in the second, the residual S compounds are removed by bringing the gases, at <300°, in contact with S-absorbing masses, e.g., mixtures of alkali carbonates and oxides or hydroxides of Fe. H. C. M.

Production of sulphur from gases containing hydrogen sulphide. ZAHN & Co. G.M.B.H., and K. DREYER (B.P. 473,248, 17.4.37).—Poisoning of the catalyst which often occurs during the catalytic combustion of H₂S-containing gases due to the deposition of C, arising out of the incomplete combustion of hydrocarbon impurities, is avoided by raising the reaction temp. to <350°, if necessary to 600°, whereby the hydrocarbons are completely burned. The requisite temp. is easily attained by using a small reaction chamber and a catalyst having the max. possible active surface. H. C. M.

Depoisoning of [fuel] gases. F. BÖSSNER and C. MARISCHKA (B.P. 473,575, 3.11.36. Austr., 4.11.35).—The apparatus claimed consists of a converter heated to about 400°, below which is a regenerator heated to about 800°. The catalyst, e.g., ankerite, which converts the CO in presence of steam into CO₂ and H₂, and absorbs the CO₂, is circulated repeatedly between the converter and regenerator without allowing its temp. to pass outside the range 400–800°. Thus it may be allowed to fall by gravity (through suitable valves) from the former to the latter and, after regeneration, may be discharged from the latter into wagons which are raised in a lift to the charging platform of the converter. Before being discharged from the regenerator the catalyst is cooled to about 400°, the heat thus carried away being utilised in some other step of the process. A. B. M.

Catalysts for deodorising exhaust gases and for removing the poisonous constituents thereof. DEGEA A.-G. (AUVERGES.) (B.P. 470,894, 26.11.36. Ger., 16.3.36).—The catalyst, a Pt metal, is deposited on a refractory and scale-proof metal, e.g., an alloy of steel with Al, Cr, Ni, Si, etc. H. C. M.

Treatment of fuel gases. F. H. ROGERS. From KOPPERS CO. OF DELAWARE (B.P. 473,009, 4.4.36).—The gases are subjected to a clearly visible a.-c. or d.-c.

brush discharge, the resin-forming impurities being then removable as suspensoids, e.g., by an oil wash. B. M. V.

Elimination of poisonous waste liquors [from producer gas washers]. P. VAN ACKEREN, Assr. to KOPPERS Co. (U.S.P. 2,067,029, 5.1.37. Appl., 16.6.33. Ger., 18.6.32).—The hot gases from producers using steam-saturated air for gas-making purposes are cooled with H₂O which flows first through the final cooling stage, then through the preliminary cooling stage, and finally to an air saturator wherein the air for the blast is bubbled through it, taking with it, besides its saturation wt. of H₂O, the poisonous hydrocarbons from the condensate. The H₂O may also be heated between the final and preliminary cooling stages, while tar is separated after the final stage. D. M. M.

Gas-analysing process and apparatus. J. D. MORGAN and A. P. SULLIVAN, Assrs. to DOHERTY RES. Co. (U.S.P. 2,057,246, 13.10.36. Appl., 26.11.32).—In the estimation of residual combustible by means of a Wheatstone bridge, one arm of which is a catalyst wire in an analyser cell and another is a plain or catalyst wire in a comparator cell, a pump draws the sample of gas through a cooler and filter and delivers it to a mixing pump, the air going to which passes through the second cell and part of the mixture from which goes through the first, devices (by-passes) being incorporated to make the velocities in the two cells equal. B. M. V.

[Indicating gas] calorimeter. A. L. SMYLY (U.S.P. 2,058,522, 27.10.36. Appl., 9.12.33).—Town's gas is supplied at const. pressure through an orifice which is const. or, at any rate, locked, the air supply is drawn in by the gas to a Bunsen burner, and its rate of supply is indicated on a manometer or other device as a measure of the calorific val. of the gas, the air supply being automatically adjusted by a photo-electric device until the luminous tip of the flame just disappears. B. M. V.

Heating of tar. S. P. MILLER, Assr. to BARRETT Co. (U.S.P. 2,064,486, 15.12.36. Appl., 1.12.28).—A pipe still for distilling tar is provided with a medium, e.g., H₂O, molten metal, etc., in a separate set of pipes which screens the tar being distilled from the direct action of radiant heat and so reduces carbonisation troubles. D. M. M.

Distillation of tar with production of a greatly increased amount of liquid distillates. O. REYNARD, and T. NESS, LTD. (B.P. 469,514, 16.7.37).—An O₂-free gas, e.g., N₂, CO₂, or coal gas, supersaturated with tar vapours is circulated through hot tar in a still and a relatively large air condenser or series of condensers maintained at such a temp. as not to relieve the supersaturation of the circulating gas. The inert gas may be made to bubble through the condensate in the condensers, except the last one, and may be prepared from air by bubbling this through a preliminary charge of tar in the still, which is then replaced by a fresh charge. Alternatively, the still may be continuously charged and discharged. D. M. M.

Distillation product [of low-temperature tar]. F. H. BERGEM, Assr. to BARRETT Co. (U.S.P. 2,066,386, 5.1.37. Appl., 3.10.30).—Resinous products are obtained by distilling the tar from low-temp. (400—600°) carbonisation of coal. The distillation is effected at high vac. ($p = 75-25$ mm.) and the fraction cut at 275—315°; it has a softening point of 40—60° and $d^{15.5}$ 1.09—1.13. D. M. M.

Asphalts of low susceptibility to temperature change. C. MACK, Assr. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 2,062,366, 1.12.36. Appl., 14.7.34).—Asphalts of this type are prepared by oxidising a crude oil residue to a product of high softening point, e.g., 190°, and with a resin content <20%, and then blending it with a residue of low softening point, e.g., 40°. H. C. M.

Production of asphaltic product. SOCONY-VACUUM OIL Co., Asses. of P. L. SMITH, V. L. SHIPP, and A. H. BOENAU (B.P. 470,864, 28.2.36. U.S., 7.5.35).—Residual petroleum stock is resolved by solvent extraction into two portions, one essentially paraffinic and the other essentially naphthenic in character. Extraction is effected by subjecting the stock to simultaneous countercurrent contact with two solvents flowing in opposite directions, the stock being thereby partitioned between the two solvents. The solvent tar containing the primarily naphthenic constituents is separated, freed from solvent and light oils, and then steam-refined or blown with gases containing free O₂ to give an asphaltic product of high ductility. H. C. M.

Melting of pitch. H. E. IMES, Assr. to BARRETT Co. (U.S.P. 2,067,450, 12.1.37. Appl., 3.6.30).—Pitch of m.p. >120°, e.g., 204°, is melted by being pulverised and screened and the portion < $\frac{1}{8}$ -in. mesh is mixed with tar or molten pitch and the mixture sprayed into a current of hot gases repeatedly until a product of the desired m.p. is produced. D. M. M.

Handling of pitch and like substances. W. SOWDEN, and CLAYTON, SON & Co., LTD. (B.P. 469,567, 29.2.36).—Molten pitch etc. is delivered as a thin layer on to the upper surface of a cylinder with its lower portion immersed in a cooling medium, e.g., H₂O, and the cylinder is rotated so as to spread the pitch over its upper surface while a scraper removes the solid pitch before the cylinder re-enters the cooling medium. D. M. M.

Production of a pulverulent binding medium [for road coverings etc.]. "STRABA" STRASSENBAUBEDARFS-A.-G. (B.P. 470,878, 11.5.36. Ger., 20.8.35).—Stone dust (10 pts.) is blown as a cloud into a mixing chamber wherein it is sprayed with hot atomised bitumen (90 pts.), the resulting product then being cooled with agitation to maintain it in the powdered state. H. C. M.

Bituminous emulsions. C. R. DE BERRY (B.P. 471,650, 16.11.36).—A mixture of ordinary bitumen and blown bitumen containing 5—25% of the latter is emulsified, e.g., with a dil. soap solution, to give a final emulsion containing 55—62% of bitumen, suitable for road-making. H. C. M.

Manufacture of bituminous materials [for roads]. A. R. EBBERTS, Assr. to COLPROVIA ROADS, INC. (U.S.P. 2,067,264, 12.1.37. Appl., 14.4.32. Cf. U.S.P. 1,937,749; B., 1934, 747).—Satisfactory blown bitumens of high m.p. are produced by removing, prior to blowing, the undesirable constituents which normally cause rubbery characteristics in the bitumen, by further distillation to a m.p. of 49—77°, with or without admixture of cracking-still residues to a straight-run residue. D. M. M.

Recovery of organic products, in particular liquid products, from solid carbonaceous substances by pressure-extraction. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 469,914, 8.2.36).—Solid carbonaceous materials, e.g., coal, peat, bituminous shale, are extracted at >20 atm. (50—200 atm.)/200—500° (300—420°) with solvents, e.g., middle or heavy oil, after addition of or pretreatment with acids or substances supplying or splitting off acids, and in presence of catalysts. Suitable catalysts are the heavy metals having $d \leq 5$, in particular, Sn, Pb, Fe, Co, Ni, Zn, V, Cr, Mo, W, Ti, or Mn, and employed either in the finely-divided state or as oxides, sulphides, carbonates, halides, or as org. compounds. H. C. M.

Manufacture of aromatic hydrocarbon compounds of low b.p. [from bituminous substances]. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 472,538, 18.2.36).—Bituminous material, e.g., coal, tar, etc., is destructively hydrogenated, e.g., at 460°/400 atm., and the resultant liquid product fractionated. The fraction boiling above 250° is then dehydrogenated, any side-chain groupings being split off before or after the dehydrogenation treatment by means of (a) halides with a splitting action, e.g., AlCl₃ at 150°, or (b) oxidising agents at elevated temp., e.g., KMnO₄ at 50—150°. The liquid product is then cracked at 400—700°, preferably in the presence of H₂ and/or while employing increased pressure, e.g., at 530° with 300 litres of H₂ per kg. of oil. The dehydrogenation may be effected (a) at 350—600°/1 atm. while using catalysts, or (b) by passage together with air or O₂ over Cu at 350°. In an example, C₆H₆, PhMe, and xylene are separated as a result of treating finely-ground mineral coal parted with heavy oil. H. C. M.

Increasing the productivity of [oil] wells. M. DE GROOTE, Assr. to TRETOLITE Co. (U.S.P. 2,050,932—3, 11.8.36. Appl., [A, B] 17.2.36).—(A) Extra-deep penetration of the oil-bearing strata is secured by forcing into the strata, for a prolonged period of time prior to its initial emulsion break-time, an acid-in-oil treating emulsion having a controlled delayed instability and containing a dormant acid-resistant de-emulsifier (I), the aq. acid (HCl) solution comprising the internal phase and the oily vehicle with the hydrophile emulsifier (II) the external phase. These two substances are chemically inert towards one another and are present in ratios so selected as to ensure a predetermined delayed-emulsion break-time. The de-emulsifier may be a non-sulphonated, hydroxy-aromatic compound (PhOH, cresylic acid), a non-aromatic hydrophile compound (sol. starch), or a sulpho-aromatic com-

pound $[\text{OH}\cdot\text{C}_6\text{H}_4\cdot\text{SO}_3\text{H}$ (I)]. (B) The emulsified, acid treating medium employed is of the H_2O -in-oil type, in which the external phase consists of an oily vehicle with a hydrophobe emulsifier, produced by adding a suitable frothing agent to the aq. acidic component and vigorously agitating this mixture (by means of a stream of air, CO_2 , or flue gases) prior to emulsification, during which the aq. component becomes the internal phase. The frothing agent may be saponin, peptone, or a sulpho-aromatic compound [e.g., (I) or cymenesulphonic acid].

H. C. M.

Preliminary procedure for conditioning of [oil] wells. M. DE GROOTE, Assr. to TRETOLITE Co. (U.S.P. 2,050,931, 11.8.36. Appl., 17.2.36).—Wax, asphaltic, or paraffinic deposits are removed from the pores of channels of oil-bearing strata to render the strata more susceptible to the subsequent conventional acid treatment for increasing the productivity of the well. A hydrophobe solution of a H_2O - and oil-sol. wetting agent which is preferentially sol. in H_2O , such as a petroleum sulphonate (preferably in the form of a Na salt derived from mahogany acids), is forced through the strata, which are then flushed with an aq. solution of a wetting agent, e.g., $1\text{-C}_{10}\text{H}_6\text{Bu}^+\text{SO}_3\text{NH}_4$.

H. C. M.

Desalting of crude oils. P. R. HERSHMAN (U.S.P. 2,064,541, 15.12.36. Appl., 7.6.34).—Oils are desalted and H_2O -in-oil emulsions broken by treating the oils with 0.05–0.5% of a mixture of a compound containing OCl' , e.g., CaOCl_2 , and a solid material containing H_2O_2 , e.g., $\text{Na}_2\text{CO}_3, \text{H}_2\text{O}, \text{H}_2\text{O}_2$, together with a stabiliser, e.g., a sol. chromate. A dry org. acid may with advantage be added.

D. M. M.

Conversion of hydrocarbon oils. UNIVERSAL OIL PRODUCTS Co., Asses. of L. C. HUFF (B.P. 471,963, 4.1.36. U.S., 24.6.35).—Low-boiling hydrocarbon oil is cracked at $510\text{--}595^\circ/20\text{--}70$ atm. and the products are cooled by a reduction in pressure and by direct admixture with a relatively heavy reflux condensate formed at an intermediate stage in the process. The resultant mixture is separated into residual liquid and vapour products, the latter then being fractionated to give a motor fuel, of the desired low boiling range and high antiknock properties, and the condensate. Apparatus is described and figured. (Cf. B.P. 468,748; B., 1937, 1011.)

H. C. M.

Conversion of heavy hydrocarbon oils into lower-b.p. hydrocarbon products. E. A. OCON (U.S.P. 2,052,148, 25.8.36. Appl., 27.12.33).—The charging stock is given a rapid vapour-phase cracking treatment at $540\text{--}820^\circ/100\text{--}600$ lb. per sq. in. in presence of superheated hydrogenous gas, and then the vapours are passed through a hydrogenating zone which is maintained at a lower temp. and pressure but for a longer reaction time. The products of the hydrogenation, after desulphurisation, are fractionated and the reflux condensate is subjected to the same cracking and hydrogenation processes but in a separately controlled stream. The vapour products of this latter treatment are then fractionated along with the products of the hydrogenation of the original

charging stock to give a blended, antiknock motor spirit. Apparatus is described and figured.

H. C. M.

Conversion of hydrocarbon oil. V. IPATIEFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,063,933, 15.12.36. Appl., 28.12.33).—Hydrocarbon oils are cracked and the mixture of fixed gases and vapours of gasoline boiling range is treated with a solid, calcined mixture of siliceous material, e.g., kieselguhr, and H_3PO_4 at, e.g., $190^\circ/75$ lb. per sq. in. in order to polymerise the fixed gases and remove gum-formers from the gasoline.

D. M. M.

Cracking and coking of hydrocarbon oils. UNIVERSAL OIL PRODUCTS Co., Asses. of L. C. HUFF (B.P. 470,576, 17.2.36. U.S., 18.2.35).—High-boiling oils comprising high-boiling fractions of the intermediate conversion products of the process are cracked at $455\text{--}510^\circ/6\text{--}35$ atm. in a primary reaction vessel, and the resultant vapours and liquid products are separated, the latter being coked in a subsequent zone. The vapour products are then fractionated for the removal therefrom of the intermediate conversion products and for the separation of the latter, together with raw charging stock, which is supplied to the fractionator, into both low- and high-boiling fractions. The low-boiling oils are cracked at $480\text{--}565^\circ/20\text{--}55$ atm. in a secondary reaction zone, and the resulting highly heated products are supplied in part to the coking zone to assist the coking therein, the remainder of the hot products being returned to the primary reaction zone for recycling. Apparatus is described and figured.

H. C. M.

Conversion and removal of sulphur from petroleum. A. L. LYMAN, Assr. to STANDARD OIL Co. OF CALIFORNIA (U.S.P. 2,060,091, 10.11.36. Appl., 13.8.32).—S in mercaptans etc. is converted into H_2S by passing the vapour of petroleum distillates, in absence of H_2 , at $290\text{--}400^\circ/>50$ lb. per sq. in. through a bed of finely-divided adsorbent of $>30\%$ porosity, the pore size being 0.030 mm. and the rate of flow 5–25 vols. of petroleum per hr., calc. as liquid per apparent vol. of catalyst.

B. M. V.

Removal of sulphur compounds from hydrocarbons. A. A. MORTON (U.S.P. 2,064,558, 15.12.36. Appl., 23.10.33).—The hydrocarbons are heated at 200° for about $\frac{1}{2}$ hr. in presence of 0.31 lb. of finely-divided Na per gal. together with a small quantity, e.g., 0.17 lb., of an aromatic hydrocarbon halide, e.g., $p\text{-C}_6\text{H}_4\text{MeCl}$. The hydrocarbon is subsequently distilled in presence of 0.01 lb. of Na per gal.

D. M. M.

Improvement of mineral oils containing lime. A. J. KRAEMER (U.S.P. 2,065,281, 22.12.36. Appl., 4.5.35).—Heavy residues from petroleum distillation or cracking which contain Ca compounds due to CaO having been added to the charging stock are mixed with just enough acid sludge from the acid purification of the distillates to neutralise the Ca and increase its rate of settling out.

D. M. M.

Solvent extraction of [hydrocarbon] oils. A. B. BROWN and F. F. DIWOKY, Assrs. to STANDARD OIL Co. (U.S.P. 2,064,338, 15.12.36. Appl., 22.3.33).

Fr., 23.3.32).—The oils are refined, their η index is improved, and naphthenic and paraffinic compounds may be separated by the use of selective solvents comprising org. compounds $R \cdot CO_2R'$, where R is a trichlorinated aliphatic residue and R' is H or an alkyl radical. Examples are $CCl_3 \cdot CO_2Et$ and $C_2H_2Cl_3 \cdot OAc$. D. M. M.

Destructive hydrogenation of organic materials. H. TROPSCH, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,057,402, 13.10.36. Appl., 13.7.34).—In the hydrogenation of hydrocarbonaceous materials, *e.g.*, heavy oil, tar, etc., by means of H_2 generated *in situ* by the reaction of CO and H_2O within the mixture, the process is effected at 400–650°/3000 lb. per sq. in. and in presence of an equimol. mixture of MgO and CaO, the MgO being in sufficient amount to catalyse the H_2 -forming and hydrogenation reactions and the CaO in sufficient amount to absorb the CO_2 thereby produced. Apparatus is described and figured. H. C. M.

Treatment of petroleum products. W. C. MERCHANT (U.S.P. 2,066,213, 29.12.36. Appl., 6.12.33).—Vapours from the distillation of crude petroleum are passed in contact with a desulphurising agent consisting of metallic oxide, *e.g.*, Cu_2O , while superheated to >205° (275°). For use, briquettes of Cu_2O and linseed oil are preferred. D. M. M.

[A—H] **Preparation of compounds for breaking of petroleum emulsions.** (A) M. DE GROOTE, W. C. ADAMS, B. KEISER, and A. F. WIRTEL, (B, C, E—H) M. DE GROOTE, (D) M. DE GROOTE and B. KEISER, Assrs. to TRETOLITE Co. (U.S.P. 2,050,923—30, 11.8.36. Appl., [A] 16.9.35, [B] 14.11.35, [C] 18.11.35, [D] 25.11.35, [E—H] 21.12.35).— H_2O -petroleum emulsions are broken by treatment with (0.001% of) (A) the product from 1–4 mols. of $H_2C_2O_4$ and 2–4 mols. of the triglyceride of a OH-fatty acid, *e.g.*, triricinolein; (B) a H_2O -sol. quaternary NH_4 salt from an alkyl (C_{8-26}) halide and C_5H_5N , NMe_3 , NEt_3 , etc., *e.g.*, cetyl- or octadecylpyridinium bromide, stearyl- α -picolinium bromide; (C) a sulphonated carboxylamide derived from a detergent-forming acid, *e.g.*, naphthenic acids, abietic acid, fatty acids, or derivatives of these, and an *O*- or *C*-sulphonated primary or *sec.* amine NRR' (R = H, alkyl, or hydroxyalkyl, R' = alkyl or aryl); (D) products obtained by interaction of a OH-compound, *e.g.*, a glyceryl phthalate containing a free OH or ricinoleic acid, with a hydroxyundecenoic acid; (E) products obtained by interaction of mixtures of a hydroxyundecenoic acid and a hydroxy- $\Delta^{6,8}$ octadecadienoic acid (I) (or the corresponding unsaturated acids and an oxidising agent), either alone or mixed with a suitable "linking agent," *e.g.*, glycerol or $H_2C_2O_4$, and in presence of an esterification catalyst (gaseous HCl) at $\geq 100^\circ$; (F) products from the interaction of mixtures of a hydroxyundecenoic acid and keto- or polyketo-fatty acids (obtained by oxidising together or separately undecenoic acid and castor oil, respectively), either alone or in presence of suitable "linking agents," *e.g.*, as in (E); (G) products similarly obtained from (I) and keto- or polyketo-fatty acids; (H) products from the interaction of (I) an aliphatic dicarboxylic acid, $[CH_2]_{5-8}$. The above

products when containing free CO_2H may be neutralised by adding bases, *e.g.*, $NaOH$, $N(C_2H_4 \cdot OH)_3$, or esterified by alcohols. They may be used as such, diluted with suitable diluents (H_2O , C_6H_6 , alcohols), or admixed with other demulsifying agents. N. H. H.

Treatment of hydrocarbons. V. IPATIEFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,067,764, 12.1.37. Appl., 28.9.34).—The fixed gases from cracking processes, which contain considerable amounts of olefines, are brought in contact with aromatics in presence of dry catalysts consisting of adsorbent materials, *e.g.*, kieselguhr and artificial porous silicious adsorbents, saturated with H_3PO_4 or $H_4P_2O_7$, and then calcined, ground, and screened. Suitable temp. and pressures are 120°/50–75 lb. per sq. in. D. M. M.

Hydrogenation of hydrocarbons. A. SZAYNA, Assr. to SINCLAIR REFINING Co. (U.S.P. 2,065,201, 22.12.36. Appl., 6.6.31).—Petroleum stock is heated at >425°/100 atm. in presence of >0.5 wt.-% of H_2 for 1–12 hr. and then separated into two stages, *viz.*, hot (400°) and cold (93°); by this means about 2–20% of the oil separates in an immiscible heavier fraction carrying with it all the asphaltic constituents of the original oil. D. M. M.

Polymerisation of hydrocarbons. R. C. OSTERSTROM, Assr. to PURE OIL Co. (U.S.P. 2,063,522, 8.12.36. Appl., 1.2.29. Renewed 20.9.34).—Cracked petroleum oils rich in unsaturateds are decolorised and degummed by countercurrent scrubbing, in vapour phase, with high-boiling oils containing polymerides of the substances to be removed. The condensate containing the polymerides is passed through a pipe still, under pressure, in presence of a finely-divided, solid catalyst, *e.g.*, clay, to effect further polymerisation; the clay is then separated, any low-boiling fraction recovered, and the high-boiling polymerides are used as fresh scrubbing oil. D. M. M.

Treatment of mineral oil distillates. A. J. VAN PESKI, Assr. to SHELL DEVELOPMENT Co. (U.S.P. 2,067,030, 5.1.37. Appl., 30.10.33. Holl., 3.11.32).—Stable synthetic oils are catalytically polymerised from cracked hydrocarbons (boiling range 75–145°) after first removing those components which give rise to unstable polymerides, these components being useful as motor fuel. The cracked mixture is distilled, cuts being taken every 10° and those fractions richest in obnoxious components are discarded, the remainder being polymerised. D. M. M.

Treatment of hydrocarbon oil. H. R. SNOW, Assr. to STANDARD OIL Co. (INDIANA) (U.S.P. 2,053,209, 1.9.36. Appl., 25.7.33).—A process for the production of stable slurries of CaO in oil, particularly in hydrocarbon oil which is to be subjected to distillation or cracking, is claimed. The H_2O and CaO are added alternately in relatively small quantities to the oil, which is agitated continuously, the temp. being prevented from exceeding 85°. Apparatus is described and figured. H. C. M.

Treatment of hydrocarbon oil. R. B. DAY, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P.

2,063,082, 8.12.36. Appl., 25.5.32. Renewed 20.5.35).—The oil is decolorised and at the same time the content of gum-formers and S compounds is reduced by treating it with HCl in presence of a chloride of a metal electropositive to H, *e.g.*, Zn, and of another chloride of a metal electronegative to H, *e.g.*, Cu, at temp. \gg the initial b.p. of the oil and sufficient to maintain the oil in the liquid phase. D. M. M.

Treatment of hydrocarbon oil. J. C. MORRELL, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,061,845, 24.11.36. Appl., 18.8.34).—Light gasoline fractions produced by cracking are treated with H_2 with formation of H_2S , the excess of H_2 being re-used after separation from the H_2S . B. M. V.

Treatment of hydrocarbon oils. C. D. LOWRY, jun., and F. J. SKOWRONSKI, Assrs. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,064,842, 22.12.36. Appl. 29.2.32).—Hydrocarbon oils are cracked in the ordinary way, the cracked product is separated into high- and low-boiling fraction, and high-antiknock components are extracted from the latter with liquid SO_2 and blended with the low-boiling fraction to produce a motor fuel of high C_8H_{18} no. The raffinate phase from the SO_2 extraction is mixed with fresh cracking stock and recycled. D. M. M.

Treatment of hydrocarbon gases. H. TROPSCH, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,063,133, 8.12.36. Appl., 30.7.34).—Liquid motor fuels are produced from normally gaseous paraffinic and olefinic hydrocarbons, *e.g.*, C_3H_8 , by subjecting them to cracking temp. *e.g.*, 482–982°, at a pressure of 400–1000 (750) lb./sq. in. in presence of <1% of Cl_2 or certain Cl compounds, *e.g.*, CCl_4 . D. M. M.

Desulphurisation and treatment of naphthas. C. B. WATSON, Assr. to PURE OIL Co. (U.S.P. 2,064,999, 22.12.36. Appl., 25.5.32).— H_2S and mercaptans are removed from petroleum oils by mixing the oils with $Ca(OH)_2$ and passing the mixture through a pipe still to an evaporator where the motor fuel or naphtha portions are vaporised and passed to a fractionating column, the CaO and heavy oil residue being discarded. The vapours are scrubbed in the fractionating column with a reflux oil containing a metallic (Cu) oxide, the reflux oil being drawn off at the bottom and recirculated after replacement of part of the oxide with fresh material. D. M. M.

Reacting olefines with sulphuric acid. K. B. LACY, Assr. to VAN SCHAACK BROS. CHEM. WORKS, Inc. (U.S.P. 2,064,667, 15.12.36. Appl., 8.4.31).—A cracked petroleum product is treated with H_2SO_4 of 65–87% concn. at 50° until the rate of absorption diminishes; the acid product is then aged at $>60^\circ$ and $<$ room temp. and afterwards treated at 50° with a further quantity of cracked product. D. M. M.

Treatment of an acid oil sludge. C. E. LAUER, R. E. MANLEY, and H. D. LOEB, Assrs. to TEXAS Co. (U.S.P. 2,064,549, 15.12.36. Appl., 15.9.32).—Fuel oil is prepared from the acid sludge left on treatment of mineral oil with H_2SO_4 by diluting the sludge with oil and H_2O and disintegrating it with steam, separating the dil. acid for recovery, and settling the un-neutralised sludge to remove tarry matters and H_2O .

The oil-sol. portion is then heated to 193–215° to decompose and remove acidic S compounds.

D. M. M.

Treating [acid oil-refinery] sludges. E. W. GARD, Assr. to UNION OIL Co. of CALIFORNIA (U.S.P. 2,066,933, 5.1.37. Appl., 20.10.30).—Acid of relatively high concn. and sludge oil of low d and η are recovered by controlling the temp. at which the sludge separates from the oil and keeping it cool, *e.g.*, at 10–20°, during storage and accumulation.

D. M. M.

Removal of acid components from hydrocarbon distillates. D. L. YABROFF and J. W. GIVENS, Assrs. to SHELL DEVELOPMENT Co. (U.S.P. 2,066,925, 5.1.37. Appl., 9.9.36).—Weakly acid substances, *e.g.*, mercaptans, are removed from org. liquids, *e.g.*, petroleum distillates, by the action of solutions of ternary sulphonium bases, these solutions being miscible with H_2O and forming two layers with the org. liquid. Suitable sulphonium bases are benzyl- or methyl-diethylsulphonium hydroxide. D. M. M.

Recovery of sulphuric acid from separated sludge acid. I. HECHENBLEIKNER and F. J. BARTHOLOMEW, Assrs. to CHEM. CONSTRUCTION CORP. (U.S.P. 2,066,685, 5.1.37. Appl., 17.4.31).—Separated, dil. oil-refinery sludge acid is heated at 177–190° under pressure, *e.g.*, 64–155 lb./sq. in., for $2\frac{1}{2}$ –4 hr. Hydrocarbons are drawn off as distillate and a tar- and C-free dil. acid remains. Concn. losses on this acid are much reduced. D. M. M.

Recovery of [oil-refinery] sulphuric acid. H. W. SHELDON, Assr. to SOCONY-VACUUM OIL Co., Inc. (U.S.P. 2,065,617, 29.12.36. Appl., 10.11.34).—Black H_2SO_4 of 89–91% concn., obtained from sludge acid by normal concn. at 290°, is continuously preheated to $>220^\circ$ by passing it down a packed tower in countercurrent to heating gases and is then passed to a quiescent pool out of contact with oxidising gases, where it is heated to $>315^\circ$ by means of vertical, internally fired, surface-combustion burners, the spent gases from which may be used in the preheater tower which also serves to absorb gases given off by this pool. Clean, conc. acid ($>95\%$) is continuously withdrawn from the pool through a scum-removing grating. D. M. M.

(A) **Stabilisation of gasoline and the like.** (B, C) **Treatment of hydrocarbon oils.** (A) J. C. MORRELL, (B, C) J. C. MORRELL and G. EGLOFF, Assrs. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,063,516–8, 8.12.36. Appl., [A] 11.11.29, [B, C] 19.6.31. Renewed [B, C] 1.7.35).—(A) Cracked gasoline is stabilised as to gum and colour formation and antiknock properties by addition of $>2\%$ of an inhibitor containing the phthalic acid radical, preferably a phthalide, or phthalic acid or anhydride. (B) Low-boiling hydrocarbon distillates are refined by treatment with dil. HCl in presence of a stable, H_2O -sol. Cu salt in aq. solution, *e.g.*, Cu_2Cl_2 , and an excess of a stable Cu salt in the solid phase, *e.g.*, $CuCl_2$. Oxidising gas and steam are also present; the reaction may be carried out at 135–315°, under pressure or vac. if desired. (C) Low-boiling hydrocarbon distillates are refined by treatment as in (B), but substituting Zn salts for Cu salts. D. M. M.

Stabilisation of unsaturated hydrocarbons.

C. P. WILSON, jun. (U.S.P. 2,052,859—60, 1.9.36. Appl., [A] 15.6.34, [B] 19.12.34).—Gum formation in cracked gasoline is prevented by addition thereto of 0.0005—0.001% of (A) a substituted polyhydric phenol (e.g., pyrogallol, pyrocatechol), or (B) a mixture of substituted *p*-aminophenols, having in each case components of turpentine as substituents.

H. C. M.

Production of motor benzol.

C. BANTA, Assr. to BARRETT Co. (U.S.P. 2,064,455, 15.12.36. Appl., 30.7.30).—Gum-forming compounds are removed by treating the crude benzol with 0.08—0.13 lb. of 85.6—93% H₂SO₄ per gal. of crude in a single wash. The washed product is separated from the acid sludge, neutralised, and distilled.

D. M. M.

Motor fuel.

R. G. SLOANE and J. I. WASSON, Assrs. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 2,066,234, 29.12.36. Appl., 23.2.33. Renewed 24.10.36).—Light liquid petroleum motor fuels having an addition of 0.1—2.0% of a gum flux consisting of liquid hydrocarbons [kauri—BuOH solvent val. >20, v.p. low under conditions in use in the engine, 50% b.p. >175°/10 mm., 37.5° Saybolt η 70—450 sec., *d* 18—28 (A.P.I.), flash point 130—190°], preferably distilled from a naphthenic-base crude oil, are claimed.

D. M. M.

Production of motor fuels.

E. SOLOMON (B.P. 472,238, 20.3.36).—The production of motor fuel from grass and/or green vegetable material and soil containing quantities of org. matter (humus) is claimed. (Cf. B.P. 463,306; B., 1937, 520.)

H. C. M.

Production of hydrocarbon products [motor fuels] by treatment of hydrocarbon gases at high temperatures.

STANDARD ALCOHOL Co. (B.P. 474,119, 30.12.36. U.S., 31.3.36).—Hydrocarbon liquids suitable for use as motor fuel are produced by heating (for >1 min.) saturated hydrocarbons of C₃—C₆ at 600—880° and 100—1000 lb./sq. in., rapidly cooling, if desired by introducing a further supply of the starting material, the resulting mixture of H₂ and olefines, and polymerising the latter at 370—550° for > $\frac{1}{2}$ min. in absence of hydrogenation catalysts and under substantially full pressure. Suitable apparatus is illustrated.

N. H. H.

Fuel.

C. A. WOODBURY and W. E. LAWSON, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,066,506, 5.1.37. Appl., 13.10.32).—The delay period between injection and ignition of fuel oil in a Diesel engine is reduced and either the ignition temp. of the fuel oil, and/or the compression ratio required, is lowered by addition of a small quantity, e.g., 5%, of a nitrate of an aliphatic polyhydric alcohol containing groups which increase their solubility in fuel oil. Examples are: $\alpha\beta$ -propylene glycol dinitrate, Et ether of glycerol dinitrate, and glyceryl monochloride dinitrate.

D. M. M.

Treatment of petroleum distillates.

J. P. SMOOTS, Assr. to STANDARD OIL Co. (U.S.P. 2,065,249, 22.12.36. Appl., 23.8.29).—Gum formation is inhibited in cracked motor fuel by addition of 0.0004—0.5% of a mixture of a monocyclic aromatic amine

and a di- or tri-hydric phenol or a C₁₀H₈ derivative, e.g., α -C₁₀H₇·OH (or pyrogallol) and NH₂Ph.

D. M. M.

Treatment of inhibitors [antioxidants for motor fuels]. V. IPATEFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,058,881, 27.10.36. Appl., 30.3.33).—The inhibiting val. of wood-tar distillate (b.p. 240—280°) is considerably increased by treatment with olefines in presence of a P acid as catalyst.

H. C. M.

Reforming of naphtha. HOUDRY PROCESS CORP., Asses. of E. J. HOUDRY (B.P. 470,588, 9.4.36. U.S., 27.4.35).—Raw or low-C₈H₁₈ naphtha is divided into a lower- and a higher-boiling fraction, each of which is separately and catalytically reformed at 470°/15—300 (75) lb./sq. in. The products of each first reforming operation are divided into a high- and a low-C₈H₁₈ residue. The low-C₈H₁₈ residue, in each case, is further reformed, separated, etc. until all the material is converted. Three examples are cited.

H. C. M.

Dewaxing hydrocarbon oil. F. X. GOVERS, Assr. to INDIAN REFINING Co. (U.S.P. 2,067,050, 5.1.37. Appl., 7.5.34).—Wax-bearing oil (1 pt.) is diluted with a solvent, e.g., C₆H₆ or a light petroleum fraction (3—4 pts.), cooled to ppt. the wax, and filtered after adding 5—10% of a polar substance, e.g., SO₂, COMe₂, or COMeEt, to improve the rate of filtration.

D. M. M.

Dewaxing of (A) mineral oils, (B) hydrocarbon oil. R. E. MANLEY, Assr. to TEXAS Co. (U.S.P. 2,067,128 and 2,067,198, [A] 5.1.37, [B] 12.1.37. Appl., [A] 19.6.35, [B] 25.7.31).—Wax-bearing mineral oil is mixed, under pressure, with a selective solvent, part or all of which consists of a volatile, normally gaseous liquid, e.g., C₃H₈ or C₄H₁₀, chilled to <—18° by indirect contact with a cooling agent consisting of some of the previously dewaxed mixture from which the volatile solvent is refrigeratively evaporated. The pptd. wax is removed by filtration under pressure and the dewaxed mixture used as fresh refrigerant by passing it outside the coils of the cooler under sufficiently low pressure to allow the solvent to evaporate and cool the fresh mixture inside the coils during its evaporation.

D. M. M.

Dewaxing of hydrocarbon oils. L. D. JONES, Assr. to SHARPLES SPECIALTY Co. (U.S.P. 2,067,193, 12.1.37. Appl., 13.2.35).—Wax is separated from mineral oil by dissolving both oil and wax in a selective solvent consisting chiefly of either or both of the two trichloroethanes with other stated hydrocarbons or chlorinated hydrocarbons, and then cooling to ppt. the wax, which is removed by any of the usual methods.

D. M. M.

Dewaxing of oil. H. F. FISHER and B. G. ALDRIDGE, Assrs. to UNION OIL Co. OF CALIFORNIA (U.S.P. 2,067,162, 5.1.37. Appl., 5.12.33).—Chilled, wax-bearing oil is passed between self-cleaning electrodes (*X* = 45,000—75,000 v. per in.), to agglomerate the wax particles, and then filtered in the usual way.

D. M. M.

Dewaxing lubricating oil. C. C. TOWNE, Assr. to TEXAS Co. (U.S.P. 2,064,506, 15.12.36. Appl.,

24.10.34).—Mineral oil is dewaxed by mixing with it a wax-crystal modifying material consisting of a fraction, b.p. $>232^\circ$, which is recovered from the high-temp. pyrolysis of normally gaseous hydrocarbons. Such addition improves the rate of filtration on chilling out the wax with or without a selective solvent. D. M. M.

(A, B) Purifying and dewaxing mineral oils. (C) Treating a cold mixture of acid sludge, oil, and wax. (A—C) G. J. STREZYNSKI and (C) G. M. PFAU, Assrs. to DE LAVAL SEPARATOR Co. (U.S.P. 2,066,164—6, 29.12.36. Appl., [A, B] 27.6.35, [C] 25.7.35. Cf. U.S.P. 2,022,814—17; B., 1936, 1023).—Crude oil containing wax is, after dilution with a lighter fraction by means of a blending pump, chilled to the desired temp. and the oil-wax mixture mixed with excess of hot 98% H_2SO_4 (about 65°) and then centrifuged, when pure dewaxed oil separates in the centre and acid sludge in the periphery, with an intermediate phase comprising oil containing wax. Special discharge valves are used in the centrifuge. (B) Crude oil is treated as in (A), but cooled to $>30^\circ$ below the desired pour point and the acid heated to $>40^\circ$, e.g., 65° . (C) The sludge from the centrifuge in (A) or (B) is separated from the oil and wax it contains by heating first to $5-15^\circ$ to separate oil and lighter waxes, and then to $50-82^\circ$ to separate the heavier waxes. A substantially oil-free cryst. wax is distilled from the waxes. D. M. M.

Solvent extraction of wax-bearing oils. S. H. DIGGS and J. M. PAGE, jun., Assrs. to STANDARD OIL Co. (U.S.P. 2,063,369, 8.12.36. Appl., 23.2.32).—Wax is removed from lubricating oil stock by treatment with a selective solvent, e.g., $(C_2H_4Cl)_2O$, at a temp. high enough to allow the components to be completely miscible, cooling being slow so that the distinct liquid phases first formed may be separated at $>$ the m.p. of the wax. The bulk of the wax collects in the separated oil; the solvent solution, after cooling to ppt. the wax (which is separated), is distilled off from the remaining oil. D. M. M.

Solvent refining of mineral oil. L. A. CLARKE, Assr. to TEXAS Co. (U.S.P. 2,067,137, 5.1.37. Appl., 7.5.35).—Lubricating oils are separated into paraffinic and non-paraffinic portions by mixing 1 pt. of oil with 1—4 pts. of a selective solvent consisting of an NH_2Ac compound, e.g., NEt_3Ac . The high- and low- η index constituents are found in the raffinate and extract phases, respectively. D. M. M.

Lubricants. N. V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 470,580, 18.2.36. Holl., 27.4.35).—The lubricating qualities of an oil or grease are improved by addition of, e.g., 6% of a mixture of high-mol. products, obtained by condensing polycarboxylic acids (I) with polyhydric alcohols (II), such products having $<27\%$ ($<20\%$) of O. E.g., unsaturated (I) prepared from soya-bean oil were esterified with $EtOH$, polymerised by means of 2% of BF_3 at 100° for 100 hr., and the acids separated by saponification. These acids were then condensed with glycerol by heating to 200° in a current of N_2 . H. C. M.

Preparation of lubricants. L. C. BEARD, jun., Assr. to SOCONY-VACUUM OIL Co., INC. (U.S.P. 2,065,551, 29.12.36. Appl., 14.3.34).—Lubricating oil with high η is prepared by cracking gas oil, separating the pressure tar, vac.-distilling this, and treating the derived viscous product with a selective solvent, e.g., SO_2 . D. M. M.

(B) [Manufacture of] (A, B) pipe-thread lubricants. H. G. SMITH, Assr. to GULF OIL CORP. (U.S.P. 2,065,247—8, 22.12.36. Appl., [A] 14.3.34, [B] 22.1.36).—The products consist of a lubricating base, e.g., petrolatum, with minor amounts of a lubricating metallic powder, e.g., Zn, and containing (A) a S-containing ingredient imparting extreme-pressure characteristics to the composition, and (B) a neutral, sulphurised fatty ester. Small amounts of a hygroscopic material, e.g., glycerin, may be included. Examples are: (A) a Ca tallow oil soap containing paraffin oil, to reduce η , mixed with 20% of Zn dust, 2% each of S and colloidal graphite, and 1% of glycerin; (B) 63.7% of lubricating mineral oil, 10.7% of Ca tallow soap, 1.0% of glycerin, 0.6% of H_2O , 20.0% of Zn dust, and 4% of sulphurised sperm oil. D. M. M.

(A) Lubricants and cutting oils. (B) Lubricants. CONTINENTAL OIL Co. (B.P. 470,756 and Addn. B.P. 471,593, [A] 14.2.36, [B] 6.3.36. U.S., [A] 14.2.35, [B] 18.3.35).—(A) Improved cutting oil and pressure lubricants may be obtained by admixing with the mineral oil a sulphurised org. acid prepared by heating an org. acid, e.g., oleic acid, pine-wood acid, or rosin oil, with S at $170-200^\circ$, the resultant lubricant having an added S content of 1—4 wt.-%. (B) The efficiency of hydrocarbon lubricating oils is increased by addition thereto of a small amount of a sulphurised ester of a mono- or di-hydric alcohol and an org. acid. Various compounds are mentioned, but the claims relate to Me oleate and the Me esters of mixed acids derived from naturally occurring products. H. C. M.

Lubricating oil. W. L. STEINER, Assr. to LUBRI-ZOL DEVELOPMENT CORP. (U.S.P. 2,063,857, 8.12.36. Appl., 10.2.34).—The film strength of lubricating oils is increased by as much as 100% by adding to the oil 0.1—10.0% (1.0%) of a halogenated terpene, e.g., pinene hydrochloride. D. M. M.

Lubricating oil. B. H. LINCOLN and A. HENRIKSEN, Assrs. to LUBRI-ZOL DEVELOPMENT CORP. (U.S.P. 2,066,354, 5.1.37. Appl., 12.4.35).—The film strength of the oil is greatly improved by addition of a small amount, e.g., 0.1—10%, of chlorinated $C_6H_4Ph_2$ or its hydrocarbon substitution products. D. M. M.

Production of lubricating oil. R. C. OSTERSTROM, Assr. to PURE OIL Co. (U.S.P. 2,067,334, 12.1.37. Appl., 19.11.31).—Unsaturated hydrocarbon distillate from vapour-phase cracking is heated to $260-315^\circ$, under sufficiently high pressure to keep it in the liquid phase, and brought in contact at that temp. with an adsorbent, polymerising catalyst, to polymerise gum- and colour-forming constituents. Fractions boiling in the gasoline range are then separated for motor fuel and the residue is distilled under vac. to remove residual pitch, a variety of

fractions being separated and refined with H_2SO_4 for use as constituents of blended lubricating oil.

D. M. M.

Production of lubricating oils. RUHRCHEMIE A.-G. (B.P. 470,534, 1.8.36. Ger., 24.8.35).—Of the liquid hydrocarbons produced by the catalytic conversion of CO and H_2 at 180–200°/1 atm., those fractions boiling at >150° are cracked at 450–550°/8–15 atm. and the resultant cracked products, consisting mainly of unsaturated compounds, are then condensed with $AlCl_3$ to give lubricating oils of low solidification point and excellent η index. The $AlCl_3$ can be used repeatedly if the temp. of each fresh condensation is progressively raised. H. C. M.

Solvent fractionation [of lubricating oil stocks]. W. B. KAY, Assr. to STANDARD OIL Co. (U.S.P. 2,066,686, 5.1.37. Appl., 22.7.35).—Lubricating oil stocks are fractionated by the use of a liquefied, normally gaseous hydrocarbon, e.g., C_3H_8 , and an org. selective solvent, e.g., cresylic acid, such that the system is characterised by a p/t phase diagram in which the area with one liquid phase and no vapour phase is separated from the area with two liquid phases and no vapour phase by a line sloping from a point of high t /low p to one of low t /high p . The process, which may be countercurrent, consists of a series of steps alternately bringing the reactants in contact and separating them, the former being at higher pressure. D. M. M.

Manufacture of pour-point depressors [for lubricating oils]. F. H. MACLAREN and T. E. STOCKDALE, Assrs. to STANDARD OIL Co. (U.S.P. 2,057,104, 13.10.36. Appl., 29.12.34. Cf. U.S.P. 1,963,917—8; B., 1935, 346).—A mixture of chlorinated wax and $C_{10}H_8$ is condensed with $AlCl_3$ at 120–150° and the resultant wax resin, after cooling to 90° and neutralisation with NH_3 gas, is diluted with a pale petroleum oil (η 100–250 sec. Saybolt at 38°) to give a 20% solution of wax resin. The diluted product is blown with air and a min. of steam at 90–105° to remove Cl and NH_4 compounds, and is then allowed to settle, whence the pure diluted depressor can be drawn off. H. C. M.

Manufacture of phenol derivatives for use in mineral oil compositions. SOCONY-VACUUM OIL Co., Inc. (B.P. 474,240, 27.4.36. U.S., 27.11.35).—The pour point of oils containing waxy solids is lowered by adding a small amount of the interaction product of a chlorinated (paraffin) wax (14% Cl) and PhOH. The latter is prepared by heating the reactants (a mixture containing < 3 atoms of Cl per mol. of PhOH), in absence of a solvent, at 66°, gradually adding $AlCl_3$ (3 wt.-% on chlorinated wax) with good agitation, and subsequently raising the temp. to about 120° over 15–20 min. and then to about 170° over about 1½ hr. The product is finally washed with H_2O (containing an alcohol, e.g., BuOH) until free from $AlCl_3$, i.e., < 0.02% of ash. N. H. H.

Lubricating composition. F. L. MILLER and A. J. MORWAY, Assrs. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 2,066,216, 29.12.36. Appl., 29.6.33).—A stable lubricant consists of a mineral oil, an alkali, alkaline-earth, or Pb soap in grease-forming

proportions, and < 2½% of a Co or Cd soap. A preferred form is 10% of Pb oleate in mineral oil + 1% of Co or Cd oleate. D. M. M.

Decolorisation of a lubricating oil stock. W. A. EBERLE and M. B. HOPKINS, Assrs. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 2,066,200, 29.12.36. Appl., 21.4.34).—The oil stock is agitated with > 4 lb. of H_2SO_4 (d 1.84) per barrel of oil, separated by gravity until the acidity of the oil corresponds with about 1 mg. of KOH per g. of stock, and then percolated through a layer of coarse clay greatly in excess of that required for neutralisation and sufficient to ensure the right final colour. D. M. M.

Decolorising viscous lubricating oil. C. F. TEARS, Assr. to PETROLEUM PROCESSES CORP. (U.S.P. 2,067,802, 12.1.37. Appl., 5.7.33).—The viscous oil, mixed under pressure with excess of liquefied C_3H_8 (solvent : oil = 1 : 1 to 10 : 1), is heated to effect complete dissolution and dilution, cooled to the optimum decolorising temp. (corresponding with solvent v.p. > 150 lb./sq. in.), and passed through a bed of adsorbent clay under pressure (> 150 lb./sq. in.). The decolorised solution is distilled under pressure to separate the C_3H_8 , which is recycled. D. M. M.

Refining of mineral oils. R. MEYER (B.P. 469,520, 12.8.36. Ger., 12.8.35).—Used lubricating oils etc. are regenerated by mixing at room temp. with an adsorption agent activated with a small quantity of H_2SO_4 and, without settling, placed in a vessel having a filter bottom heated from below, the oil passing through and the adsorption agent being prevented from consolidating on the filter bottom by the heat from below. D. M. M.

Waste renovation and oil-reclamation system. A. U. AYRES, Assr. to SHARPLES SPECIALTY Co. (U.S.P. 2,050,080, 4.8.36. Appl., 30.1.33).—Oily waste from [rail]-car journals is washed in an oil-bath from which a portion of the oil is removed at intervals and subjected to settling, heating, and centrifuging. Part of the oil thus purified is returned to the washing tank so that the proportion of solid and liquid impurities in the tank does not become excessive. Periodically, all the oil is run from the tank and purified. C. C.

Adhesive grease composition. J. C. ZIMMER and A. J. MORWAY, Assrs. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 2,062,346, 1.12.36. Appl., 21.3.35).—A hydrocarbon lubricating oil, preferably a paraffinic or mixed-base petroleum fraction, is first admixed with > 30% (5–15%) of a Ca or Al soap, and then 0.1–2.0% of a linear polyamide, selected from the group consisting of polymerised CMe_2CH_2 and polymerised hydroxystearic acid having an average mol. wt. of > 30,000, is added. H. C. M.

Furnace and method for heating fluids [hydrocarbon oil]. J. G. ALTHER, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,066,664, 5.1.37. Appl., 7.12.32. Renewed 23.5.36).

Flashing of mineral oils. M. R. FENSKE and W. B. McCLUER, Assrs. to PENNSYLVANIA PETROLEUM RES. CORP. (U.S.P. 2,067,627, 12.1.37. Appl., 13.9.33).

Combined still and coil cracking [of petroleum]. F. A. HOWARD, Assr. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 2,068,856, 26.1.37. Appl., 25.7.29).

(A) Remote-control, (B) gauge-line purging, system from oil-cracking plants. R. M. PARSONS, Assr. to R. M. PARSONS Co. (U.S.P. 2,068,695—6, 26.1.37. Appl., [A] 16.10.34, [B] 2.3.35).

Cracking of hydrocarbon oils. R. E. WILSON, Assr. to STANDARD OIL Co. (INDIANA) (U.S.P. 2,064,708, 15.12.36. Appl., 30.6.34).

[Oil-cracking] tube still. W. T. HANCOCK (U.S.P. 2,060,306, 10.11.36. Appl., 6.11.34).

Conversion of hydrocarbon oil. L. C. HUFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,063,505, 8.12.36. Appl., 30.1.28. Renewed 8.10.35). P. H. SULLIVAN, Assr. to GASOLINE PRODUCTS Co., INC. (U.S.P. 2,066,808, 5.1.37. Appl., 11.7.33).

Conversion of hydrocarbon oils. LE R. G. STORY, Assr. to TEXAS Co. (U.S.P. 2,065,351, 22.12.36. Appl., 28.9.34). E. F. NELSON, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,067,782, 12.1.37. Appl., 10.11.30. Renewed 12.2.35). H. V. ATWELL, Assr. to PROCESS MANAGEMENT Co., INC. (U.S.P. 2,069,191, 26.1.37. Appl., 31.10.34). J. C. MORRELL, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,063,112 and 2,063,114, 8.12.36. Appl., [A] 24.7.31, [B] 29.5.35. Renewed [A] 4.1.34). L. C. HUFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,064,834, 22.12.36. Appl., 2.1.31. Renewed 4.3.36). J. C. MORRELL, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,066,693, 5.1.37. Appl., 1.12.30).

Apparatus for converting higher-boiling hydrocarbons into lower hydrocarbons. C. P. DUBBS, Assr. to UNIVERSAL OIL PRODUCTS CORP. (U.S.P. 2,067,832, 12.1.37. Appl., 12.9.29. Renewed 8.10.35).

Coking liquid hydrocarbons. H. V. ATWELL, Assr. to GASOLINE PRODUCTS Co., INC. (U.S.P. 2,064,715, 15.12.36. Appl., 29.3.33).

Treatment of mineral oils [with solvents]. M. R. FENSKE and W. B. MCCLUER, Assrs. to PENNSYLVANIA PETROLEUM RES. CORP. (U.S.P. 2,064,422, 15.12.36. Appl., 9.11.33).

Treatment of hydrocarbons. C. H. ANGELL, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,067,810, 12.1.37. Appl., 11.2.32. Renewed 27.4.34).

Treatment of hydrocarbon oil. P. C. KEITH, jun., Assr. to GASOLINE PRODUCTS Co., INC. (U.S.P. 2,064,757 and 2,065,470, [A] 15.12.36, [B] 22.12.36. Appl., [A] 26.7.34, [B] 31.8.34). J. DELATTRE-SEGUY, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,066,697, 5.1.37. Appl., 22.11.30. Renewed 28.3.34). R. H. PRICE and R. V. SHANKLAND, Assrs. to STANDARD OIL Co. (INDIANA) (U.S.P. 2,067,730, 12.1.37. Appl., 23.5.34). W. W. GARY and J. T. WARD, Assrs. to GASOLINE PRODUCTS Co., INC. (U.S.P. 2,067,847, 12.1.37. Appl., 7.6.34). LE R. G. STORY, Assr. to TEXAS Co. (U.S.P. 2,067,865, 12.1.37. Appl., 15.11.32).

Apparatus for treatment of hydrocarbon oil. H. DIMMIG, Assr. to GASOLINE PRODUCTS Co., INC. (U.S.P. 2,066,100, 29.12.36. Appl., 30.10.34).

Treatment of hydrocarbon oils. J. G. ALTHER, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,063,072, 8.12.36. Appl., 31.10.30. Renewed 17.10.35). O. BEHMER, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,064,816, 22.12.36. Appl., 22.10.32). J. C. MORRELL, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,064,846, 22.12.36. Appl., 5.12.31). J. CUTTER, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,066,097, 29.12.36. Appl., 6.6.31. Renewed 23.3.35). H. V. ATWELL, Assr. to GASOLINE PRODUCTS Co. (INC.) (U.S.P. 2,067,869, 12.1.37. Appl., 26.7.34).

Oil distillation. R. F. HADLEY (U.S.P. 2,064,743, 15.12.36. Appl., 18.5.34).

Oil purification and fractionation. V. G. SHINKLE, Assr. to MOTOL, INC. (U.S.P. 2,065,619, 29.12.36. Appl., 14.2.31).

Liquid [engine fuel oil] purifier. C. H. BICHLER and G. EYSSARTIER (U.S.P. 2,061,343, 17.11.36. Appl., 26.5.34. Fr., 2.6.33).

Oil reclaimer. F. A. HEADSON (U.S.P. 2,067,396, 12.1.37. Appl., 18.10.33).

Multi-hearth furnace. Control of catalytic converters. Oil-refinery heat exchangers etc. Polar absorbents. Separating machine [for coal etc.]. Purifying gasoline. Treating liquids with gases. Rectification. Separating flowing fluids. Shock-absorber liquid.—See I. C₂H₄. Fuels. Compounds of high mol. wt.—See III. CaC₂. Recovering S [from gases]. SO₂ from acid sludge.—See VII. Road-making material.—See IX. Oil-well sucker rods.—See X. Washer for petroleum emulsions.—See XI. Insecticide.—See XVI.

III.—ORGANIC INTERMEDIATES.

Preparation of pure methane from natural gas. E. H. BOOMER, C. A. JOHNSON, and V. THOMAS (Canad. J. Res., 1937, 15, B, 360—362).—All the hydrocarbons in natural gas except CH₄ are decomposed by passing at a suitable speed through a quartz tube at 780°. Means for removing the decomp. products (olefines, aromatic, C, CO, H₂) are described. S compounds are mainly converted into H₂S.

E. S. H.

Oxidation of methane at high pressures. I. Preliminary experiments. E. H. BOOMER and J. W. BROUGHTON (Canad. J. Res., 1937, 15, B, 375—382).—By passing natural gas (CH₄ 95.7, C₂H₆ 1.4, C₃H₈ 0.9, N₂ 2.0%) mixed with O₂ over Cu or Ag catalyst at 300—350°/100—180 atm. a MeOH yield >30% of theory is obtained. Small quantities of CH₂O and HCO₂H are also produced. E. S. H.

Oxidation of methane at high pressures. II. Experiments with various mixtures of Viking natural gas and air. III. Experiments using pure methane and principally copper as catalyst. E. H. BOOMER and V. THOMAS (Canad. J. Res., 1937,

15, B, 401—413, 414—433).—II. Formation of high yields (up to 74%, based on C oxidised) of MeOH in presence of activated Cu (cf. preceding abstract) is, in accordance with Bone (A., 1932, 1001) and Norrish (A., 1935, 1081), dependent on a large O deficiency and an optimum temp., the range investigated being 350—500°. The influence of pressure over the range 140—230° atm., and of variation of reaction time, is negligible. The catalyst is poisoned by traces of S compounds and heavy hydrocarbons.

III. Similar results were obtained using CH₄ in which the higher hydrocarbons in the natural gas, which may be C₂H₆ or cyclic compounds, are absent. The optimum temp. is 450°. Ag and glass are as efficient as, but steel is less so than, Cu. The process has no commercial val. F. R. G.

Purification of crude synthetic methyl alcohol by oxidising agents. V. M. NIKITIN (J. Chem. Ind. Russ., 1937, 14, 1067—1072).—Satisfactory purification of crude MeOH is achieved by diluting to 75% MeOH and heating with KMnO₄ at 30°. CaOCl₂ or NaOCl also oxidises impurities, but the product contains Cl, and the process requires special non-corroding containers. The action of K₂Cr₂O₇ in feebly acid solution is slow, and also involves corrosion of Fe vessels. Oxidation by atm. O₂ in presence of Fe^{III} and Cu^{II} is slow. The rate of decoloration of KMnO₄ by MeOH depends, not only on the content of unsaturated compounds and aldehydes, but also on that of Fe^{III} and Cu^{II}; Fe^{III} originates from decomp. of Fe(CO)₅, and Cu^{II} from decomp. of some unidentified volatile Cu compound. R. T.

Rôle of copper in methyl alcohol catalysts. V. M. NIKITIN (J. Chem. Ind. Russ., 1937, 14, 1229—1230).—Polemical, against Pospechov (B., 1937, 116, 646). R. T.

Rapid control of chlorohydrin production. D. KOLLER (Prom. Org. Chim., 1937, 4, 191—194).—An appliance for automatic registration of the conductivity (κ) of the solution in the reaction of prep. of chlorohydrin (I) from C₂H₄ and Cl₂ in H₂O is described. In presence of excess of C₂H₄ the κ is due to HCl, the content of which is \propto that of (I). Presence of excess of Cl₂ in the gas causes an abrupt rise in κ , due to formation of HOCl. R. T.

Manufacture of carbon disulphide. ANON. (Ind. Chem., 1937, 13, 437—441).—A description of the new plant of the West Cumberland By-Products Co. at Flimby.

Synthesis of acetic acid from ethylene. B. G. ŠIMEK and J. STERN (Chem. Listy, 1937, 31, 340—344).—Formation of AcOH from C₂H₄ in coal gas by the action of KOH is confirmed. The optimum conditions are: KOH 27%, at 380—400°/200—300 atm. The chief side-reactions are those of polymerisation of olefines, and of hydrogenation by H₂ produced by the corrosive action of the KOH on the walls of the autoclave. R. T.

Synthesis of benzene from acetylene. Y. KATO and H. AIKAWA (J. Electrochem. Assoc. Japan, 1935, 3, 261—264).—C₂H₂ is heated to 630° by admixture with hot inert gas; rapid cooling gives a 90% yield of polyacetylene. CH. ABS. (r)

Manufacture of diphenyl by pyrolysis of benzene. K. ANDRIANOV, F. KVITNER, and V. TITOVA (Prom. Org. Chim., 1937, 4, 161—164).—Ph₂ is obtained in 37% yield by repeatedly passing C₆H₆ over fireclay at 750°; *m*-, *p*-, and probably *o*-C₆H₄Ph₂, m.p. 174°, b.p. 372°, are also formed in small amounts. R. T.

Hydrogenation in presence of catalytic alloys at high pressures. I. Hydrogenation of aromatic compounds. I. RAPOPORT and E. SILTSCHENKO (J. Appl. Chem. Russ., 1937, 10, 1427—1434).—The catalytic activity rises in the order Co-Si < Co-Al < Ni-Al < Ni-Co-Si < Ni-Co-Al, in the reactions of hydrogenation of PhOH to cyclohexane, and of C₁₀H₈ to tetrahydronaphthalene, at 180—200°/100 atm. The activity of a given catalyst rises with diminishing granule diameter, and is increased by treatment with KOH to a greater extent than with NaOH. Hydrogenation of C₁₀H₈ is very slow in presence of <5 mols. of H₂ per mol. of C₁₀H₈. R. T.

Synthesis of styrene from the xylene fraction of the products of pyrolysis of petroleum. S. POPOV and A. BELLIN (Prom. Org. Chim., 1937, 4, 152—157).—The xylene fraction is further rectified and the fraction boiling at 133—139° is shaken with 97% H₂SO₄ and again fractionated. The PhEt fraction, b.p. 135—137°, is chlorinated at 100—110° (2.5 hr.), and the product distilled. The fraction of b.p. 80—93°/20 mm., containing most of the CH₂Ph·CH₂Cl, and boiling 10% Na₂CO₃ yield CH₂Ph·CH₂·OH, from which CHPh·CH₂ is obtained by distillation from KHSO₄. R. T.

Preparation of diphenylamine. M. BEZZUBETZ and E. SCHAPSON (Prom. Org. Chim., 1937, 4, 28—30).—NHPh₂ is obtained in 75% yield by heating a mixture of NH₂Ph 93, NH₂Ph·HCl 93, and AlCl₃ 30 g., at the b.p., for 36 hr. AlCl₃ cannot be replaced by FeCl₃, CuCl₂, or ZnCl₂. R. T.

Analytical control of production of β -naphthylamine-5:7- and -6:8-disulphonic acids. N. BUNTZELMAN, A. ILJINA, V. SCHVEDOVA, and G. AGIBALOVA (Prom. Org. Chim., 1937, 4, 86—89).—An analytical procedure, based on the stability in acid solution of the product of coupling of *p*-NO₂·C₆H₄·N₂Cl with the 5:7- but not with the 6:8-acid, is described. R. T.

Preparation of *p*-chlorophenol from *p*-dichlorobenzene. V. MINAEV, B. FEDOROV, and G. SARNIT (Prom. Org. Chim., 1937, 4, 19—22).—*p*-C₆H₄Cl·OH is obtained in 85% yield by autoclaving *p*-C₆H₄Cl₂ (I) 1, NaOH 3.375, and MeOH 10.7 g.-mols. for 25 hr. at 200°; presence of >20% of H₂O in the MeOH does not affect the yield, but MeOH cannot be replaced by H₂O, PhOH, or EtOH. The reactions are represented by: (I) + NaOMe (II) \rightarrow *p*-C₆H₄Cl·OMe \rightleftharpoons *p*-C₆H₄Cl·ONa + Me₂O; MeOH + NaOH \rightarrow HCO₂Na + H₂; HCO₂Na + NaOH \rightarrow Na₂CO₃ + H₂. R. T.

Preparation of intermediates for synthesis of isocyanine sensitizers. V. ALEXEEVA (Prom. Org. Chim., 1937, 4, 23—28).—The prep. of a no. of toluquinaldines by Conrad and Limpach's method (B., 1887, 679) (condensation of amines with CH₂Ac·CO₂Et) is described. R. T.

Polymerisation of hydrocarbons. Products from carbonisation of wood. Prep. of synthetic products from petroleum.—See II. Fusel oil. EtOH from potatoes and batate.—See XVIII. Detecting MeOH and/or Pr^oOH in preps. Decomp. of paraldehyde on storage.—See XX. Toxicity of chlorinated hydrocarbons.—See XXIII.

See also A., II, 480, Prep. of unsaturated alcohols. 481, Prep. of Et esters, using PhMe. 482, Electrolytic reduction of glycollic and lactic acids. 483, Synthesis of higher dicarboxylic acids. Prep. of Me *d*-glucosonate. 489, Sulphonaphthenic acids. Prep. of bromomesitylene. 490, Halogenation of acenaphthene. 491, Pyrene synthesis. 496, Prep. of *p*-phenyltriphenylcarbinol. 498, Prep. of 2:4-dinitrobenzonitrile and -benzoic acid.

PATENTS.

Manufacture of hydrocarbons and their derivatives containing oxygen from carbon monoxide and hydrogen. I. G. FARBENIND. A.-G. (B.P. 473,932, 26.11.36, Ger., 30.11.35).—Hydrocarbons or their O derivatives are prepared by bringing a mixture of CO and H₂, at temp. >150° (200–450°) and preferably under pressure, in contact with a catalyst prepared by thermal treatment of an Fe compound at >600° but below the m.p. or sublimation point of the Fe compound or the resulting Fe, followed by treatment with reducing gases (H₂). The Fe compound is preferably such as may be converted into oxide by simple thermal treatment, and the activity of the catalyst may be increased by addition of other substances, e.g., Al(OH)₃. R. G.

Separation of ethylene from higher olefines. W. J. TENNANT. From DOW CHEM. CO. (B.P. 474,414, 22.12.36).—C₂H₄ is separated from gases containing higher olefines (coke-oven gases and gases obtained by the pyrolysis or cracking of hydrocarbon oils and gases) by admixture with C₆H₆ or a suitable (liquid) derivative and treatment of this with a Friedel-Crafts catalyst, e.g., commercial anhyd. AlCl₃ (0.01–0.03 mol. per mol. of C₆H₆), at >50° and in a closed vessel at 10–50 lb./sq. in. The higher olefines, e.g., CHMe:CH₂, butenes, amylenes, are thus removed from the gas mixture as liquid alkylbenzenes. If desired, the butenes and amylenes can be removed prior to the above treatment by, e.g., chlorination or hydrolysis with H₂SO₄. N. H. H.

Separation of tertiary olefines from gas mixtures. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 473,501, 27.7.36).—*tert.* Olefines in mixed gases are converted into *tert.* alkyl halides by reaction with 10% excess of H halide (HCl) at 50–120° in presence of a Mg or Ba halide catalyst. The *tert.* halides are conveniently separated by scrubbing with high-boiling solvents. The separation of CMe₂:CH₂ from Δ^β-butene and of CMe₂:CHMe from CHPr^β:CH₂ is described in the examples. S. C.

Polymerisation of olefines. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 474,831, 4.4.36).—In polymerising olefines in presence of acids or acid

esters of P or compounds of BF₃, the preferential formation of one compound in the product is controlled by maintaining an excess of an undesired component either by adding it to the original monomeride or by removing the desired component as it is formed. The polymerisation of C₃H₆ in presence of H₃PO₄ at 180°/20 atm. to give 90% of tetrameride or 70% of trimeride by adding trimeride or tetrameride, respectively, to the monomeride, of C₄H₈ in presence of H₃PO₄ (80°/2 atm.) to yield 80% of dimeride, and of technical olefine mixtures is described. A. H. C.

Chlorination and bromination of hydrocarbons. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 474,922, 14.5.36).—Aliphatic hydrocarbons (> C₃) are chlorinated or brominated in the vapour phase so that the halogenated compound is instantly condensed by injecting Cl₂ or Br through capillaries in countercurrent to the hydrocarbon vapour. Apparatus in which the halogenated material is returned to the distilling vessel as it is formed is described. A. H. C.

Purification of chlorinated hydrocarbons. I. G. FARBENIND. A.-G. (B.P. 475,109, 13.5.36, Ger., 4.7.35).—Slow decomp. of chlorinated aliphatic hydrocarbons contaminated by metal salts is avoided by converting the salt into non-volatile compounds by treating with an olefine oxide [(CH₂)₂O] and H₂O, which are preferably removed (by adsorption) before distilling. A. H. C.

Manufacture of fluorine-containing carbon compounds. H. W. DAUDT and M. A. YOUKER, Assrs. to KINETIC CHEMICALS, INC. (U.S.P. 2,062,743, 1.12.36, Appl., 12.6.35).—Fluoroparaffins are obtained by interaction of a halogenoparaffin (halogen other than F) with HF in presence of a catalyst SbF_xCl_{5-x} where x < 3. Operation may be carried out under pressure (apparatus figured). Among examples (48), gaseous HF (500) and CCl₄ (1925) are passed during 25 hr. into SbCl₅ (600) at 60° contained in a reactor (figured) from which HCl and a mixture of CCl₂F₂ 60% and CCl₃F 40% distils to scrubbers and condensers. Similarly, C₂Cl₄F₂ and C₂Cl₃F₃ (I) are obtained by treating SbCl₅ (300) with gaseous HF (40) at 75°, then adding C₂Cl₆ (8.7), heating the mixture at 110° for 5 hr., and distilling. Further, liquid HF (140) is added at 8 pts./hr. to a mixture of SbCl₅ (830) and SbCl₃ (250) at 100° and 75 lb./sq. in. followed by 20 pts. at 4 pts./hr. There are then introduced continuously at 160–170° HF (3) Cl₂ (2.5), and C₂H₆ (5.9 pts./hr.) and the reaction gases removed, maintaining the pressure at 70–125 lb./sq. in. The product is C₂Cl₂F₄ (II) (100) and (I) (32 pts.), which can be returned to increase the yield of (II). K. H. S.

Manufacture of dry alkali-metal alkyl sulphates. C. O. HENKE and W. H. LOCKWOOD, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,062,454, 1.12.36, Appl., 7.6.35).—Dry alkali alkyl sulphates (< C₈) are produced by treating the alkyl H sulphates with an alkali halide under anhyd. conditions and completing the reaction if necessary with conc. aq. alkali. E.g., the alcohol mixture (C₈–18) obtained by hydrogenating coconut oil is

treated with ClSO_3H , then with dry NaCl at $40-95^\circ$, and salt formation completed with conc. aq. NaOH .
A. H. C.

Manufacture of alkyl phosphates. V. IPATIEFF, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 2,062,312, 1.12.36. Appl., 30.4.32).— H_3PO_4 is esterified by interaction with olefines at >1 atm. in presence of H_2SO_4 as catalyst.
A. H. C.

[Manufacture of] polyhydric alcohol esters. W. E. LAWSON, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,062,918, 1.12.36. Appl., 28.3.35).—All the OH groups in a long-chain aliphatic polyhydric alcohol $\text{C}_n\text{H}_{2n+2-x}(\text{OH})_x$, where $x = <3$, $n = 11-22$ (18), or mixture of such alcohols where n is even, are esterified with (aliphatic) monobasic carboxylic acids. This may be achieved by peracylation (peracetylation) of unsaturated alcohols followed by complete esterification of the remaining OH groups with a monobasic carboxylic acid. *Octadecanetriol 1:9:10-triacetate* and *-trilaurate* and *octadecanetetraol 1:9:10:12-tetra-acetate* are claimed. The products are high-boiling H_2O -resistant plasticisers for cellulose derivatives and natural and synthetic resins and may be used in the prep. of lacquers.
R. G.

Manufacture of formic acid. I. G. FARBENIND, A.-G. (B.P. 475,016, 23.3.37. Ger., 25.3.36).— HCO_2H is made by simultaneously adding equiv. quantities of $\text{HCO}\cdot\text{NH}_2$ and aq. H_2SO_4 to HCO_2H at $<85^\circ$ (125°) and distilling the HCO_2H as it is formed.
A. H. C.

Preparation of aliphatic acid halides. P. J. WIEZEVICH and P. K. FROLICH, Assrs. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 2,062,344, 1.12.36. Appl., 1.8.31).—Interaction of CO , COCl_2 , or COS with alkyl halides for restricted contact times at $300-900^\circ$ in a bath of inert metal or salt yields acid halides, which may be absorbed in a solvent. The prep. of AcCl from MeCl and 3 vols. of CO at $860/0.3$ sec. is claimed.
A. H. C.

Manufacture of arylamines [aniline]. W. S. CALCOTT and L. S. BAKE, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,062,349, 1.12.36. Appl., 21.9.32).—Aromatic halogen compounds (PhCl) are converted into amines (NH_2Ph) by heating with aq. NH_3 (5.5 mols.) containing <0.05 (0.2) mol. of a Cu compound (CuSO_4) sol. in aq. NH_3 at about 230° in a vessel in which the parts in contact with the reaction mixture are of stainless steel containing about 18% Cr and 8% Ni.
R. G.

Preparation of secondary aromatic and heterocyclic amines. CALCO CHEM. Co., INC., Asses. of A. G. and A. J. HILL (B.P. 473,739, 26.11.36. U.S., 6.12.35).—Aromatic and heterocyclic sec. amines are prepared by passing the vapour of the corresponding primary amine at reaction temp. ($>400^\circ$) over a non-base-exchanging catalyst consisting mainly of an oxide of Al or Ti. The catalyst may be regenerated by heating in a stream of air. Claim is made to the conversion of NH_2Ph , $p\text{-C}_6\text{H}_4\text{Me}\cdot\text{NH}_2$, and $\beta\text{-C}_{10}\text{H}_7\cdot\text{NH}_2$ into the corresponding sec. amine.
R. G.

Dye intermediates. J. W. LEITCH & Co., LTD., A. E. EVEREST, and J. A. WALLWORK (B.P. 474,638,

16.6.36).—Arylamides of $2:3\text{-OH}\cdot\text{C}_{10}\text{H}_6\cdot\text{CO}_2\text{H}$ or $\text{CH}_2\text{Ac}\cdot\text{CO}_2\text{H}$ are made into powders sol. in H_2O by mixing with stable, finely-divided salts of sufficient alkalinity to dissolve the amide and one or more wetting or dispersing agents in powder form. Among examples (6), "Brenthol AS" (10), "Sulphonated Ocenol Powder" (5), and powdered Na_2SiO_3 (35) or "Brenthol OT" (10), "Gardinol CA Powder" (6), and powdered Na_3PO_4 (44 lb.) are mixed to a uniform powder ready for immediate use.
K. H. S.

Diazo composition. L. H. FLETT, Assr. to NAT. ANILINE & CHEM. Co. (U.S.P. 2,062,873, 1.12.36. Appl., 14.4.34).—Pastes of diazonium salts of the C_6H_6 and C_{10}H_8 series free from SO_3H or CO_2H and stabilised either by metallic halides or arylsulphonic acids are dried by admixture with partly dehydrated $\text{MgSO}_4\cdot 7\text{H}_2\text{O}$. In the example, a moist press-cake containing H_2O (25) and the diazonium chloride derived from $1:3:4\text{-NO}_2\cdot\text{C}_6\text{H}_3(\text{NH}_2)\cdot\text{OMe}$ (37) stabilised with ZnCl_2 (15) and SnCl_4 (1) is mixed with MgSO_4 containing 16–17% of H_2O (40); alum (36) and Na_2SO_4 (7 pts.) are added to the dried mass.
K. H. S.

Manufacture of oil-soluble polyhydric phenols. C. P. WILSON, jun. (U.S.P. 2,063,212, 8.12.36. Appl., 29.5.34).—Phenols containing o - or p -OH groups (oxidation inhibitors) are rendered sol. in oils by alkylating at reflux temp. with olefines (e.g., those contained in crude C_6H_6 or in cracked distillates) in presence of AcOH and 50% H_2SO_4 . Products derived from o - and $p\text{-C}_6\text{H}_4(\text{OH})_2$ and from pyrogallol are claimed and the use of turpentine as the olefine constituent is described.
A. H. C.

Production of substituted phenols and fuels. BECK, KOLLER & Co. (ENGLAND), LTD. (B.P. 473,438, 4.5.36. Austr., 7.5.35).—Cracking benzines containing olefines are caused to interact with PhOH or a homologue in presence of AlCl_3 , ZnCl_2 , or similar metal halide, alone or in presence of a H halide, which may be generated from an org. compound (e.g., tert. alkyl chloride, alicyclic halide, or CH_2PhCl) under the conditions of the reaction. Readily volatile constituents are dissolved in excess of PhOH or in a high-boiling solvent before the reaction, if necessary after conversion into the halide. The reaction products are separated, e.g., by distillation, into high-grade hydrocarbon fuels, unchanged PhOH , and higher alkylphenols suitable for condensing with CH_2O to give resins, particularly for oil varnishes.
S. C.

Production of acetamidonaphtholsulphonic acids. G. MAURER and S. G. FORD, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,062,368, 1.12.36. Appl., 22.5.34).—Aminonaphtholsulphonic acids are acetylated by dissolving and partly neutralising in H_2O so that the solution remains acid, stirring the solution with Ac_2O , and completing the reaction by making alkaline (Na_2CO_3) and heating the product at $70-80^\circ$. The acetylation of $1:8:3:6\text{-NH}_2\cdot\text{C}_{10}\text{H}_4(\text{OH})(\text{SO}_3\text{H})_2$ and $2:5:7\text{-NH}_2\cdot\text{C}_{10}\text{H}_5(\text{OH})\cdot\text{SO}_3\text{H}$ is claimed.
A. H. C.

Manufacture of β -phenylethyl alcohol and homologues thereof. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 475,022, 7.5.36).—

$\text{CH}_2\text{Ph}\cdot\text{CH}_2\cdot\text{OH}$ or its homologues may be prepared by interaction of PhCl or its homologues with Mg or a Mg alloy with, if necessary, a metal halide as promoter but in absence of Et_2O (cf. B.P. 474,687; B., 1938, 40) and then further treating the Grignard compound with an olefine oxide $[(\text{CH}_2)_2\text{O}]$ in a solvent.

A. H. C.

Manufacture of monocarboxylic acids. C. CONOVER, ASSR. to MONSANTO CHEM. CO. (U.S.P. 2,063,365, 8.12.36. Appl., 1.5.33. Can., 29.7.29).—Monocarboxylic acids are prepared by decarboxylating polycarboxylic acids or anhydrides [e.g., $o\text{-C}_6\text{H}_4(\text{CO})_2\text{O}$ and its Cl-derivatives, $(\cdot\text{CH}_2\cdot\text{CO})_2\text{O}$] in the molten or vapour state at $200\text{--}250^\circ$ in presence of H_2O and catalysts containing a compound of Cr activated by heavy-metal (Cu , Ni , Ag , Co) and alkali-metal compounds.

A. H. C.

Manufacture of [8-]bromo[- α -]naphthoic acid. D. A. W. FAIRWEATHER and IMPERIAL CHEM. INDUSTRIES LTD. (B.P. 473,992, 25.4.36).—8:1- $\text{C}_{10}\text{H}_6\text{Br}\cdot\text{CO}_2\text{H}$ (I) is obtained in high yield by interaction of anhydro-8-hydroxymercuri- α -naphthoic acid (II) and Br in aq. HCl . E.g., a solution containing (II) (371), 88% KOH (112), and H_2O (2700 pts.) is cooled to $0\text{--}5^\circ$, aq. HCl (d 1.16; 200) is added, then a solution containing Br (165), aq. HCl (d 1.16 320), and H_2O (1660 pts.) is added rapidly, stirring is continued for $\frac{1}{2}$ hr., and the product washed and dried. The operations in the presence of HCl are all done at $0\text{--}5^\circ$. Yield is 251 pts. of (I), m.p. 176° .

R. G.

[Manufacture of] esters [for coating compositions]. R. E. THOMAS, ASSR. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 2,062,950, 1.12.36. Appl., 11.9.34).—Monocarboxylic carboxylic acids (abietic and hydroabietic acids) are esterified with the alcohols obtained by carboxylic reduction of the fatty acids of an essentially saturated fatty oil (coconut oil) having $\text{C}_{12}\text{H}_{25}\text{OH}$ as its principal component. *Dodecyl abietate* and *hydroabietate* are claimed, and the prep. of *dodecyl salicylate* and *tetradecyl abietate*, also a mixed $\text{C}_{6\text{--}18}$ abietate from the mixed alcohols obtained by hydrogenating fatty acids of vegetable oils, is described. The products are used in coating compositions.

R. G.

Manufacture of [aromatic] carbon compounds of high mol. wt. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 473,653, 15.4.36).—Aromatic hydrocarbons having ≤ 4 condensed nuclei (benzanthrene, pyrenes, chrysenes, perylenes, benzopyrenes, triphenylenes, coronenes, naphthanthracenes, pyranthrenes, and hydropyrenes) are caused to interact with aliphatic or cycloaliphatic compounds containing $\leq \text{C}_7$, one of the starting materials containing halogen (e.g., alkyl or acyl chloride), if necessary in presence of a solvent and a condensing agent of the type used in Friedel-Crafts reactions, to give compounds $\text{R}(\text{A}\cdot\text{B})_n$, where A is CO or CH_2 . In the examples, pyrene is condensed with $n\text{-C}_8\text{H}_{17}\text{Cl}$ at 250° and perylene with $\text{C}_{17}\text{H}_{35}\text{COCl}$, $\text{C}_{11}\text{H}_{23}\text{COCl}$, and mixed acid chlorides at 200° or at $20\text{--}30^\circ$ in presence of AlCl_3 . The products impart a vivid and powerful fluorescence to mineral oils.

S. C.

Manufacture of derivatives of 1:4-diaminoanthraquinone. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 473,762, 17.4.36).—O-Sulphates of 1:4-dihydroxyalkylaminoanthraquinones are produced by interaction of H_2SO_4 esters of primary amino-alcohols with leuco-1:4-diaminoanthraquinones (or the quinone + a reducing agent), followed by (air) oxidation. E.g., interaction of leuco-1:4-diaminoanthraquinone (I) with $\text{NH}_2[\text{CH}_2]_2\text{SO}_3\text{Na}$ (II) (excess) in 80% aq. MeOH , followed by aëration in presence of a little $\text{Cu}(\text{OAc})_2$ and piperidine, gives Na_2 di- β -sulphatoethylaminoanthraquinone; use of equimols. of (II) and NH_2Me gives 1-methylamino-4- β -sulphatoethylaminoanthraquinone. Similar results are obtained with a mixture of (I) with quinizarin, 1:4:5:8-tetra-aminoanthraquinone, 1-amino-4-cyclohexylaminoanthraquinone, and with $\alpha\beta$ - or $\alpha\gamma$ -propanol- or $\alpha\beta$ -butanol-amines. H. A. P.

[Manufacture of] polycarboxylic acid esters. W. E. LAWSON, ASSR. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 2,062,917, 1.12.36. Appl., 25.1.35).—In a polycarboxylic acid of ≤ 5 C at least one CO_2H is esterified with an unsaturated normal aliphatic monohydric alcohol of ≤ 3 C and another with a saturated monohydric alcohol. Δ^9 -Octadecenyl stearyl and crotyl *Bu phthalate* are claimed. The products are used in coating and plastic compositions.

R. G.

Production of cyclic terpene alcohols. C. O. HENKE and G. ETZEL, ASSRS. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 2,063,162, 8.12.36. Appl., 19.9.34).—*iso*Bornyl esters are hydrolysed to *iso*borneol (I) by aq. alkali in presence of a solvent which is immiscible with H_2O and removes solid alcohol as it is formed. E.g., the formate obtained from camphene, HCO_2H , and H_2SO_4 is added to aq. NaOH and C_6H_6 at 50° , hydrolysis completed at $130^\circ/4$ atm., and (I) isolated by distilling in steam; the C_6H_6 prevents solid alcohol blocking the condenser.

A. H. C.

Manufacture of 4:6-diamino-2-alkylpyridines. H. J. SCHNEIDERWIRTH (U.S.P. 2,062,680, 1.12.36. Appl., 3.3.36).—2-Alkylpyridines are heated with NaNH_2 (2 mols.) at temp. $>200^\circ$ and the melt is treated with H_2O . In examples, α -picoline (100) is added to NaNH_2 (95) at 120° and the temp. raised during 16 hr. to 310° ; H_2O (400 pts.) is added slowly after cooling to 100° . Separation of 3:6- from 4:6-diamino-2-methylpyridine, m.p. $52\text{--}53^\circ$, is effected by fractional crystallisation or distillation. 4:6-Diamino-2-propylpyridine, m.p. $106\text{--}107^\circ$, is obtained similarly. The substances form dyes when coupled with diazo compounds.

K. H. S.

Manufacture of acridinium compounds. I. G. FARBENIND. A.-G. (B.P. 473,843, 20.4.36. Ger., 20.4.35).—The compounds (I) formed by 2:8-diaminoacridinium hydroxides with ketones (cf. B.P. 434,497; B., 1935, 1069) are decomposed into their components by heating with H_2O ; the resulting aq. acridinium hydroxides may be converted into salts or into ethers (by direct interaction with an alcohol or phenol or its metal derivative). By heating (I) with acids, acid salts, salts of weak bases, or acid amides, acridinium salts are formed direct. E.g., the com-

pound from 2 : 8-diamino-10-methylacridinium hydroxide (II) and COMe_2 is heated at the b.p. with a large excess of H_2O and the COMe_2 liberated is removed and condensed; an aq. solution of (II) is formed. Similarly, salts of (II) are formed by heating with aq. quinic, 2-ketopyridyl-5-arsinic, and camphoric acids, NH_4F , NH_3PhCl , $\text{NaNH}_4\text{HPO}_4$, and NH_2Ac (acetate); the aq. solution of (II) with 1 : 2 : 3- $\text{C}_6\text{H}_3(\text{OH})_3$ and isoamyl alcohol gives ethers.

H. A. P.

Manufacture of organo-magnesium compounds. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 474,687, 7.5.36).— MgPhCl and its homologues are prepared by boiling PhCl or its homologues under atm. pressure and in absence of Et_2O with Mg or a Mg alloy having a clean, unoxidised surface; the surface may be rendered reactive by addition of halide of a metal (Al) or a metalloid or an organo- Mg halide. Aromatic, hydroaromatic, or aliphatic hydrocarbons of high b.p. may be added as diluent or suspending medium for the organo- Mg compound, or an excess of the chlorohydrocarbon may be used and the reaction stopped before the whole of the Mg has been converted.

R. G.

Conducting reactions at high temp.—See I. C_2H_2 from gas mixtures. C_2H_2 generator. **Hydrocarbon products.** Aromatic hydrocarbons from bituminous substances. Phenol derivatives. Treating org. compounds.—See II. CaC_2 .—See VII. Oils from vinylacetylene.—See XII. Condensation products. Emulsions.—See XIII. Sulphonamides. Camphor. Camphoric amides. Salts of 9-aminoacridines.—See XX.

IV.—DYESTUFFS.

Azo and anthraquinonoid dyes containing the cyanuric ring. H. E. FIERZ-DAVID and M. MATTER (J. Soc. Dyers & Col., 1937, 53, 424—436).—Cyanuric chloride (I) is hydrolysed by conc. H_2SO_4 at 150° : $\text{C}_3\text{N}_3\text{Cl}_3 + 6\text{H}_2\text{O} \rightarrow 3\text{NH}_4\text{Cl} + 3\text{CO}_2$; with KOH-EtOH at the b.p. it gives $\text{C}_3\text{N}_3(\text{OK})_3$, which is slowly hydrolysed on continued heating. 4 : 6-Dichloro-2-anilino-1 : 3 : 5-triazine, m.p. 138° , is readily formed from (I) and NH_2Ph in $\text{H}_2\text{O} + \text{Na}_2\text{CO}_3$ or in C_6H_6 , but with H_2O -sol. aminonaphtholsulphuric acids the primary (1 : 1) condensation product is formed only if these acids are added together with aq. Na_2CO_3 to an aq. suspension of (I) at 0° ; at room temp. *sec.* (1 : 2) and at 90 — 100° *tert.* (1 : 3) condensation products result. These products are hydrolysed with increasing difficulty as their complexity increases and Cl content decreases, and in the reductive fission of azo dyes containing the C_3N_3 nucleus hydrolysis of the latter does not normally occur. Azo dyes are identified by reductive fission; among the resulting products benzenoid *p*-diamines are identified by conversion into indophenols (characterised spectroscopically) and complexes containing the cyanuric ring by comparison of their colour reactions with synthetic compounds, e.g., the compounds from 1 : 2 : 6 : 3- $\text{OH}\cdot\text{C}_{10}\text{H}_4(\text{NH}_2)_2\cdot\text{SO}_3\text{H}$ (1 mol.), (I) (1 mol.), and *p*- $\text{NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{NHAc}$, 4 : 1 : 3- $\text{C}_6\text{H}_3\text{Cl}(\text{NH}_2)_2$, or 1 : 4 : 3- $\text{C}_6\text{H}_3(\text{NH}_2)_2\cdot\text{SO}_3\text{H}$, 8 : 2 : 7 : 3 : 6- $\text{OH}\cdot\text{C}_{10}\text{H}_3(\text{NH}_2)_2(\text{SO}_3\text{H})_2$ (II) (2 mols.) and (I), or (II)

(1 mol.), (I) (1 mol.), and *p*- $\text{C}_6\text{H}_4(\text{NH}_2)_2$, or corresponding compounds in which the residual Cl is replaced by NPh . The following were thus identified, their identity being confirmed by synthesis: Chlorantine Fast Rubine RLL, Cu_2 derivative of

$2[\text{p-OH}\cdot\text{C}_6\text{H}_4\cdot\text{SO}_3\text{H} \leftarrow 2 : 6 : 7\text{-C}_{10}\text{H}_5(\text{NH}_2)_2\cdot\text{SO}_3\text{H}] \rightleftharpoons$ (I) $\leftarrow \text{NH}_2\text{Ph}$; Chlorantine Fast Blue 8G, *p*- $\text{NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{NHAc} \rightarrow$ (I) $\leftarrow 1 : 8 : 3 : 6\text{-NH}_2\cdot\text{C}_6\text{H}_4(\text{OH})(\text{SO}_3\text{H})_2$ (III) $\leftarrow 3 : 1 : 4\text{-NH}_2\cdot\text{C}_6\text{H}_3\text{Me}\cdot\text{OMe}$ (IV) $\leftarrow 1 : 4 : 2\text{-NH}_2\cdot\text{C}_6\text{H}_3(\text{NO}_2)\cdot\text{SO}_3\text{H}$; and Chlorantine Fast Green BLL, *o*- $\text{OH}\cdot\text{C}_6\text{H}_4\cdot\text{CO}_2\text{H} \leftarrow \text{p-C}_6\text{H}_4(\text{NH}_2)_2 \rightarrow$

(I) [$\leftarrow \text{NH}_2\text{Ph}$] \leftarrow (III) \leftarrow (IV) \leftarrow (III). The prep. of dyes from 1-aminoanthraquinone (V) (2 mols.) and (I) (also further condensed with NH_2Ph), from (V) (3 mols.) and (I), and from 1-amino-4-methoxyanthraquinone (2 mols.), NH_3 (1 mol.), and (I) (identical with Cibanone Red G) is described. Attempts at hydrolytic and reductive fission of anthraquinonoid cyanuric dyes to recognisable anthraquinone derivatives failed.

H. A. P.

Cellulose dye compounds. J. SEIBERLICH (Rayon Text. Month., 1937, 18, 775).—Benzylcellulose (I) (70) is nitrated during 3 hr. at -5° with a mixture of H_2O (230), conc. HNO_3 (350), and H_2SO_4 (900 c.c.), then reduced with aq. HCl and Zn , diazotised, washed, and coupled with NPhMe_2 , NPhEt_2 , $\alpha\text{-C}_{10}\text{H}_7\cdot\text{NH}_2$, and $\alpha\text{-C}_{10}\text{H}_7\cdot\text{OH}$. The dyes are sol. in (I) solvents and afford coloured films (cf. B.P. 346,385, 347,117, and 347,263; B., 1931, 672, 716).

K. H. S.

Preparation and study of AS-type Naphthols of the fluorene series. B. PORAT-KOSCHITZ and PEREKALIN (Prom. Org. Chim., 1937, 4, 165—170).—2 : 7-Diamino-fluorene (I), -fluorenone, or -fluorenol and 3-hydroxy- β -naphthoic acid in *p*- $\text{C}_6\text{H}_4\text{Cl}_2$ and PCl_3 (2 hr. at the b.p.) yield 2 : 7-di-3'-hydroxynaphthamido-fluorene (II), m.p. about 280° , -fluorenone, m.p. about 330° , or -fluorenol, m.p. about 310° . 2 : 7-Di-salicylamido-fluorene, m.p. 267° , is prepared analogously to (II), and 2 : 7-diacetoacetamido-fluorene, m.p. 167° , is obtained from (I) and $\text{CH}_2\text{Ac}\cdot\text{CO}_2\text{Et}$ in xylene at 135 — 145° (4 hr.). The above substances yield a series of dyes, ranging in colour from yellow to blue-black, with a no. of diazonium salts; the substantivity to cotton and the fastness to light of the dyes fall in the series fluorene > fluorenone > fluorenol.

R. T.

Corrosion of metals in preparation of Alizarin Pure Blue. C. TZEITLIN (Prom. Org. Chim., 1937, 4, 34—37).—Resistance to corrosion by 12% HBr at 60° rises in the order $\text{Fe} < \text{Ni} < \text{Pb} < \text{Ag} < 17\% \text{Fe-Si}$; Fe-Si containers are the most suitable for conducting bromination of aminoanthraquinone, and Fe-Cr containers for condensation of the Br_2 -derivative with *p*- $\text{C}_6\text{H}_4\text{Me}\cdot\text{NH}_2$, and for sulphonation of the product. The use of cast Fe is counterindicated, not only because of its ready corrosivity, but also because of the resulting adverse effect on the purity and yield of the final product.

R. T.

Reactions used in the synthesis of dyes. I. Sulphonation of anthraquinone with concentrated and fuming sulphuric acid of various concentrations. II. Nitration of anthraquinone with

mixed acid. III. Halogenation of aliphatic and aromatic compounds. IV. Ring-closure of some derivatives of *o*-benzoylbenzoic acid in concentrated sulphuric acid. R. ODA and K. TAMURA (Bull. Inst. Phys. Chem. Res. Tokyo, 1937, 16, 921—1057).—I. The rate of sulphonation of anthraquinone (I) increases with the $[H_2SO_4]$ and reaches a max. with 100% H_2SO_4 . The rate is a min. with oleum (5% SO_3).

II. (I) with HNO_3 -90% H_2SO_4 gives the best yield of I-nitroanthraquinone.

III. No details are given.

IV. The following compounds suffer ring-closure with conc. H_2SO_4 , the first most easily: o - $C_6H_4Bz \cdot CO_2H > o$ -toluoylbenzoic acid $> o$ -4'-chlorobenzoylbenzoic acid. *o*-Naphthoylbenzoic acid is sulphonated if the temp. is too high. J. L. D.

*iso*Cyanine sensitisers.—See III. Helio-gen Blue.—See XIII.

See also A., II, 491, [Dyes resulting from] reactions of $CCl_3 \cdot SCl$ and amines. 520, Dyes derived from 8-hydroxyquinolinealdehydes and from 2-hydroxyanthraquinonealdehyde. 521, Derivatives of *lin.*-benzodipyridine. 522, Synthesis of indigotin.

PATENTS.

Manufacture of azo dyes [for acetate silk]. I. G. FARBENIND. A.-G. (B.P. 474,678, 4.5.36. Ger., 6.6.35. Addn. to B.P. 409,921; B., 1934, 666. Cf. B.P. 449,089; B., 1936, 825).—6-Bromo- or 6-chloro-2:4-dinitroaniline is diazotised and coupled with a 3-hydroxy-1:2:3:4-tetrahydro- α -naphthaquinoline carrying Cl at 7, 8, 9, or 10, to give greenish-blue dyes for acetate silk. C. H.

Production of water-insoluble azo dyes [pigments and ice colours]. M. A. DAHLEN and M. E. FRIEDRICH, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,063,589, 8.12.36. Appl., 11.1.35).—A suitable arylamine is diazotised and coupled with a 2:3-hydroxy-naphthoic *m*-5-xylidide which may carry halogen at 2 and 4 in the xylene nucleus. Examples are: *m*-5-xylidide \leftarrow 4-nitro-*o*-anisidine (red) or 4-chloro-*o*-toluidine (bluish-scarlet); 4-chloro-*m*-5-xylidide \leftarrow 4:4'-NH($C_6H_4 \cdot NH_2$)₂ (bluish-black); 2-chloro-*m*-5-xylidide \leftarrow 3-nitro-*p*-toluidine (bluish-red pigment, m.p. 319—320°). C. H.

Manufactures of acid wool dyes of the anthraquinone series. I. G. FARBENIND. A.-G. (B.P. 472,652, 26.3.36. Ger., 26.3.35).—A halogenoalkyl-aminanthraquinone, in which the halogenoalkyl has $\leftarrow C_2$, is treated with a sulphite. Examples are: 1- β -chloroethylaminanthraquinone, m.p. 174°, with Na_2SO_3 (red); 4-cyclohexylamino-1-(γ -chloro- β -hydroxypropylamino)anthraquinone with Na_2SO_3 (blue). C. H.

Manufacture of acid wool dyes of the anthraquinone series. I. G. FARBENIND. A.-G. (B.P. 473,884, 16.3.36. Ger., 15.3.35).—An arylamine of the C_6H_6 series having NHAc, CO-NR₂, and/or CN *m* and/or *p* to NH₂ is condensed with a 4-halogeno-1-aminoanthraquinone-2-sulphonic acid; the NHAc may be introduced by acetylation of a suitably placed

NH₂ after condensation. Examples are: 4-bromo-1-aminoanthraquinone (I) with 1:3:5-NH₂- $C_6H_3(CO \cdot NMe_2)_2$ (reddish-blue), or 1:4:3-NH₂- $C_6H_3(NHAc) \cdot CO \cdot NMe_2$ (bluer); (I) with 2:4-(NH₂)_{2- $C_6H_3 \cdot CN$, acetylated (reddish-blue). C. H.}

Manufacture of compounds [vat dyes] of the anthraquinone series containing nitrogen and sulphur. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 473,914, 16.6.36).—The dyes of B.P. 389,961 (B., 1933, 583) are nitrated and reduced. Mono- (moss-green) and di- (greyish-olive) -nitro- and -amino-compounds are described. C. H.

Manufacture of flavanthrone. F. L. ENGLISH, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,062,450, 1.12.36. Appl., 20.2.34).—Flavanthrone is made by first passing Cl_2 (165) into a mixture of $PhNO_2$ (2900) made from synthetic HNO_3 (*i.e.*, prepared by oxidation of NH_3), $SbCl_5$ (620), and I (0.12) at 10—40°, then adding 2-aminoanthraquinone (200 pts.), and heating at 200—225°. K. H. S.

Manufacture of vat dyes [of the benzanthrone series.] A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 472,325, 24.3.36).—The compound (annexed formula, where R = an anthraquinone residue in which the NH₂ and NH occupy α -positions, and R' = an anthraquinonyl or aminoanthraquinonyl residue), made by alkaline condensation of a suitable benzanthrone-1-aminoanthraquinone, is condensed with a halogenated vattable compound (other than an acylating compound). The resulting vat dye may be sulphonated to give a more sol. vat, and/or carbazolated. Examples are (I) (in which the NH₂ is at 5, and R' = α -anthraquinonyl) with 1-chloroanthraquinone (II) (reddish-grey; sulphonated, neutral grey), with 1-chloro-5-benzamidoanthraquinone (similar), with 0.5 mol. of dibromoanthanthrone (III) (bluish-grey), or with 0.5 mol. of dibromopyranthrone (brownish-black); (I) (in which the NH₂ is at 5, and R' = 5-amino-1-anthraquinonyl) with 2 mols. of (II) (reddish-grey; sulphonated, neutral grey), or with 2 mols. of (III) (bluish-grey). C. H.

Manufacture of triarylmethane dyes [and their metal complex derivatives]. G. W. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 472,407, 25.3.36).—An aldehydosalicylic acid is condensed with 2 mols. of a *sec.* or *tert.* arylamine, the components having in addition to the CO_2H at least one SO_3H , CO_2H , hydroxyalkyl, or hydroxyalkoxy group; the resulting leuco-compound is oxidised in substance or on the fibre, and the dye or the dyed material may be treated with metal compounds. Examples are: 5-aldehydo-*o*-cresotic acid (I) with methyl- β -sulphoethylaniline (after-chromed on wool, reddish-violet); 5-aldehydosalicylic acid with $NPhBu^a \cdot [CH_2]_2 \cdot SO_3H$ (after-chromed, bluish-violet); (I) with sulphobenzylethylaniline (after-chromed, bluish-violet), or with $NPh(C_2H_4 \cdot OH)_2$ (metachrome violet). C. H.

[Manufacture of] indigoid compounds [vat dyes] containing fluorine. H. A. LUBS and

A. L. FOX, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,061,200, 17.11.36. Appl., 3.4.33).—Indigoid dyes containing nuclear F or CF_3 are prepared by usual general methods. Examples are indigoids from: 6-fluoro-2-hydroxythionaphthen with 5:7-dibromoisatin (I); 6-chloro-2-hydroxy-5- (or 7-)trifluoromethylthionaphthen with (I); 6-chloro-5- (or 7-)trifluoromethylthioisatin (II), m.p. 203—204°, from oximinoacet-m-trifluoromethylanilide, m.p. 144—146°, with 6-chloro-2-hydroxy-4-methylthionaphthen; reduction of (II) with H_2S . C. H.

[Manufacture of] fluorine-containing [thioindigoid] vat dyes. J. E. COLE, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,061,186, 17.11.36. Appl., 6.12.33).—Thioindigoid dyes containing nuclear F or CF_3 are prepared by usual general methods. Examples are: 4:4'-difluorothioindigo from $p\text{-C}_4\text{H}_4\text{F}\cdot\text{NH}_2$ (I) via $p\text{-fluorophenylthiourea}$, m.p. 163—164°; 5:5'-difluorothioindigo (orange) from (I) via 5-fluoro-1-aminobenzthiazole, m.p. 181—182°; difluoronaphthathioindigos (grey) from $1\text{-C}_{10}\text{H}_7\text{F}$ via 1-fluoro-2-naphthylthioglycolic acid, m.p. 103°, and from $2\text{-C}_{10}\text{H}_7\text{F}$ via the 2:1-thioglycolic acid, m.p. 90—95°; 4:4'- or 5:5'-di(trifluoromethyl)thioindigo (pink) from $m\text{-NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{CF}_3$ (II) via $m\text{-trifluoromethylphenylthioglycolic acid}$, m.p. 53.5—55°; 5:5'-dichloro-4:4'- (or -6:6'-)di(trifluoromethyl)thioindigo (pink) from (II) via the S_2Cl_2 compound, m.p. 230—231°; thioindigoids from the condensation of 5-fluoro-2-hydroxythionaphthen with 5-chloro-4- (or -6-)trifluoromethylisatin dimethylaminoanil (scarlet), or with acenaphthenequinone etc. C. H.

Manufacture of asymmetric indigoid-thioindigoid colours. E. HAVAS, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,063,161, 8.12.36. Appl., 28.9.34).—The Al compound of a thioindoxyl obtained by action of AlCl_3 on a thioglycolyl chloride is condensed directly with an isatin. Examples are: Al compound from $\beta\text{-C}_{10}\text{H}_7\cdot\text{S}\cdot\text{CH}_2\cdot\text{CO}_2\text{H}$, PCl_5 , and AlCl_3 , with 4:6- or 5:7-dibromoisatin. C. H.

Manufacture of dyes [of the phthalocyanine series]. G. W. JOHNSON. From I. G. FARBEN-IND. A.-G. (B.P. 474,740, 5.3.36).—A halogen-free phthalocyanine is chlorinated or brominated in presence of diluent and halogen-carrier at $<200^\circ$ so as to introduce >12 halogen atoms. Green pigments are obtained. C. H.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Keratin fibres. W. T. ASTBURY and H. J. WOODS (Chem. and Ind., 1937, 1076—1077; cf. Harrison, B., 1937, 1033).—That the elastic properties of hair and wool are not due to the cuticle is proved by the fact that they are also shown by descaled fibres, isolated cortical cells, and strips cut from the interior of horn, porcupine quill, etc. The suggested explanation of the change from α - to β -keratin as due to a change in crystal structure from orthorhombic to monoclinic would involve an unobserved 50% increase in density. The fact that β -keratin can be produced without stretching is shown not to be a valid argument against its formation being due to unfolding of polypeptide chains. A. G.

[Keratin fibres.] J. B. SPEAKMAN, J. L. STOVES, and C. S. WHEWELL (Chem. and Ind., 1937, 1077—1078).—The evidence that permanent set is due to the formation of new cross-linkings is reviewed. MgSO_4 does not prevent permanent set. Many reagents attack the cystine linking and promote supercontraction, but no reagent is known which attacks this linking but does not promote supercontraction. A. G.

Determination of the volumetric swelling of fibrous materials. P. ECKERT and K. HOINKIS (Papier-Fabr., 1937, 35, 441—443).—A very fine capillary U-tube is used for measuring the vol. of a sample before and after immersion in H_2O , and the swelling is expressed as the % increase in vol. The sample is contained in a vessel, with a perforated bottom, interposed in the U-tube, and the measuring medium is H_2O -saturated toluol. An accuracy between individual readings of 3% is obtained, and results of measurements with different materials (animal wool, cotton, regenerated cellulose fibres, etc.) are given. The apparatus can also be used with impregnated textiles. D. A. C.

Spray test for evaluating water-repellency [of fabrics]. A. A. COOK and J. ZAPARANICK (Amer. Dyestuff Rep., 1937, 26, 323—325).—Apparatus is described by which a 6-in. square of the fabric is uniformly sprayed with H_2O for 1 min., followed by shaking and pulling over a knife edge to remove mechanically adhering drops of H_2O ; the H_2O -repellency is measured by the increased wt. of the fabric. A. J.

Moisture adsorption in cotton and other fibrous insulating materials: proposed explanation. A. C. WALKER (Text. Res., 1937, 7, 229—239, 289—297).—A cotton hair swells 20% in diameter and only 1% in length in passing from the dry state to saturation in H_2O , and this is discussed with reference to the fine structure of the hair. H_2O adsorption by cotton is assumed to occur first on the cuticle followed by diffusion as vapour into the pits and adsorption on the pit walls; H_2O in the pits then penetrates along the growth-ring surfaces. At equilibrium with any R.H. $<$ that required for formation of a unimol. layer the H_2O mols. are distributed uniformly over all the internal surface, but at higher R.H. multimol. layers of uniform thickness form on the fibril surfaces only, since H_2O on the growth-ring surfaces of these fibrils appear to be responsible for the transverse swelling of the cotton. The fibril surface is $<50\%$ of the total internal surface, and when H_2O condenses on it H_2O -chains spring (and are separated) from each other according to the cellulose OH groups in this surface. H_2O adsorbed by the remaining internal surface (this is within the fibrils) is located on the ends of the crystallites and is responsible for the slight longitudinal swelling. Only 1% of H_2O is required to form a unimol. layer on the total internal surface. It is calc. that the total H_2O capable of being retained by a wet cotton fibre is 143% as compared with 50% (cf. Coward and Spencer; B., 1923, 221) which is found in thoroughly hydro-extracted fibres. A theory is proposed to explain the dependence of the electrical

properties of fibres on their H_2O adsorption and fine structure. A. J. H.

Progress in rayon pulp manufacture. C. L. MOORE (Rayon Text. Month., 1937, 18, 590—592, 694—696.)—Pulp suitable for viscose manufacture can now be precisely specified, and pulps fulfilling the specification can be prepared from Manchurian spruce and from pine. Before cooking, logs are stored for 4—6 months, and this results in a diminished and more regular H_2O content, in the coagulation of the sap, and in a change of the resin from a gummy into a more cryst. form. The bleaching of the cooked pulp must be carefully controlled; if the liquor is too acid it results in excessive degradation of the cellulose, and if too alkaline the reactivity of the pulp is diminished. A. G.

Present-day methods for dissolving cellulose derivatives. K. S. VALENTINE (Chem. Met. Eng., 1937, 44, 612—616).—Machines of the turbine type are described, designed to dissolve nitrated cotton, cellulose acetate, and cellulose xanthate. A. G.

Elimination of excess of ammonia from cuprammonium cellulose solutions for spinning. A. PAKSCHVER, M. KETSCHIEVA, and E. MANKASCH (Prom. Org. Chim., 1937, 4, 184—188).—The NH_3 is present in combination with cellulose (I) and with Cu, in adsorption on (I), and in solution. The amount adsorbed is expressed by βC^2 , where β is a const. for a given (I), and C is the (I) concn. Elimination of dissolved NH_3 from the solutions should be accomplished at pressures < the partial NH_3 pressure. R. T.

Chemistry of spinning solutions for cuprammonium fibre. II. Influence of salts on the preparation and properties of cuprammonium cellulose solutions. S. DANILOV, J. GOLDFARB, A. TSCHERNIAEVA, and N. GORIUNOVA (J. Appl. Chem. Russ., 1937, 10, 1457—1467).— $Cu(OH)_2$ dissolves more readily in aq. NH_3 when Na_2SO_4 or $(NH_4)_2SO_4$ is present. The coagulative action of a series of cations and anions falls in the order $NH_4^+ > Li^+ > Na^+ > K^+$; $\frac{1}{2}C_2O_4^{2-} > \frac{1}{2}SO_4^{2-} = Cl^- > NO_3^- > CNS^- > HCO_3^-$. R. T.

Dispersion of cellulose during its conversion into artificial silk. A. RAZUMEEV, B. ZALTZMAN, and A. ZELDITSCH (Prom. Org. Chim., 1937, 4, 12—14).—The η of 1% solutions of cellulose is lowered to 30% of the original val. during its conversion into viscose silk; the processes preceding xanthation are largely responsible for this effect. The content of mixed cotton-viscose silk fibres may roughly be derived from determination of the η of their solutions. R. T.

Viscosity of cuprammonium solutions of cellulose. H. LACHS and A. I. GROSMAN (Monatsh., 1937, 70, 302—317).—The reduced η in cuprammonium of cellulose regenerated from alkali cellulose falls at first rapidly with the duration of ripening, and then more slowly; the fall is faster at a higher temp. The reduced η is independent of the temp. of measurement (20—24°), but increases linearly with the concn., i.e., $\eta_{sp}/c = A + Bc$; the vals. of A and B fall with increasing degradation (diminishing η) of the cellulose. The vals. of the

axial ratio l/d , calc. from $\eta_{sp}/c = l^2/30d^2 + Kl^4c/d^4$, fell from 177 for the unripened cellulose to 89 after ripening for 148 hr. at 19°, corresponding with mol. wts. of 41,600 and 20,900 if the axial ratio of glucose is 0.69. Vals. of K varied randomly. A. G.

Stretch-spinning of viscose with concentrated sulphuric acid. T. KOMORI (J. Cellulose Inst. Tokyo, 1935, 11, 244—249).—Viscose filaments begin to gelatinise with about 30% of H_2SO_4 in the bath. They are easily spun at a velocity of 50—60 m./min. if the $[H_2SO_4]$ is < 55%. They are markedly gelatinised and swell at any higher concn., and are dispersed in a 61% bath. Addition of $ZnSO_4$, $MgSO_4$, and/or glucose to the bath with an acid concn. < 65% results in easier spinning. The yarn increases in strength but the elongation decreases. CH. ABS. (e)

Dependence of strength of artificial silk on conditions of spinning and on the quality of the cellulose. A. S. SCHPITALNI and E. A. MEOS (J. Appl. Chem. Russ., 1937, 10, 1468—1477).—The tensile strength, elasticity, and imbibition of viscose fibres fall with increasing destruction of the initial cellulose, and stronger fibres cannot be obtained from such cellulose by raising its concn. in the viscose solution. Spinning of viscose of low concn. in an ordinary pptg. bath leads to lowering of the strength and to raising of the hardness of the fibres. R. T.

Continuous flow in the manufacture of viscose staple fibre. H. JENTGEN (Achema Jahrb., 1937; Rayon Text. Month., 1937, 18, 463—464, 519—520).—Wood pulp can be continuously mercerised either as flock, endless sheeting, or boards, but the squeezing out of excess of alkali from flock and sheeting is difficult. For continuous ageing, a slightly inclined, internally heated, rotating cylinder is used, or the material is carried on an apron through an oven, but xanthation and filtration have not yet been conducted continuously. A. G.

Destruction of rayon by bacteria and mildews. H. J. HENK (Kunstseide, 1937, 19, 326—327).—Regenerated cellulose rayons are attacked not only by cellulases, but also by lichenase and other hemi-cellulases, and they can be completely hydrolysed to glucose. They are not damaged by the diastatic products used in sizing or desizing. A. G.

Wood cellulose. A chemical raw material. R. S. HATCH (Canad. Chem. Met., 1937, 21, 334—336). A. G.

Wood chemistry. X. Chemical composition of akamatsu (*Pinus densiflora*). Y. UYEDA and T. OHTA (J. Cellulose Inst. Tokyo, 1937, 13, 383; cf. B., 1937, 1321).—Analytical data are given, including cellulose 50.27, lignin 25.59, and loss on drying 11.17%. A. G.

Chemical composition of *Picea ajanensis*. I. SCHIMODA and S. KAMIHARA (J. Cellulose Inst., Tokyo, 1937, 13, 384—390).—Data are given showing the variation in composition of the wood with the height above the ground and the distance from the centre of the trunk. With increasing height the ash and cellulose contents decrease, and the C_6H_6 -EtOH extract and pentosan content increase. The cellulose

content increases towards the centre, and the contents of lignin and mannan vary irregularly. A. G.

Pulp. I. Analysis of pulp wood from Saghalien and Korea. K. SHISHIDO, T. KIMURA, S. MICHITAKA, K. C. CHING, and Y. FUKUDA (*J. Cellulose Inst. Tokyo*, 1935, 11, 224—226).—Data for six woods are recorded. CH. ABS. (e)

Pulp from deciduous woods. J. TEICHER (*Papier-Fabr.*, 1937, 35, 443—445).—The author's experiences with the production of sulphite pulp from eucalyptus wood in Brazil are described. A bleached pulp with a high α -cellulose content was obtained and was used both for the prep. of viscose silk and for incorporation to the extent of 25—30% in wood-free papers, the quality of which in some respects it improved. Fibre dimensions, ash content, EtOH extract, and yield of raw pulp from eucalyptus are very similar to those of beech wood. D. A. C.

Ether-soluble material in sulphite pulp from Southern pine. C. CARPENTER (*Paper Trade J.*, 1937, 105, TAPPI Sect., 224—229).—Sulphite-pulping of longleaf, loblolly, or slash pine removes 60% of the Et₂O-sol. material originally present in the wood, and blow-pit washing and lapping of the stock on rotary filters together remove a further 20%, the pulp then containing 1—2%, sufficient to give pitch trouble during processing. When a dil. suspension of such pulp, however, is passed over an inclined wire, the Et₂O extract is reduced to 0.6%, owing to the removal of ray cells, epithelial cells, fibre fragments, and dirt, and pitch trouble during bleaching and beating no longer occurs. The Et₂O-sol. material is a dark brown oil, consisting principally of unsaturated fatty acids, resin acids, and unsaponifiable matter, Ca and S being present only in traces. The removal of pitch-forming material by this washing entails a fibre loss of 2—6% and the use of 28,000—45,000 gals. of H₂O per ton of pulp. H. A. H.

Rosenblad system for recovery of heat and sulphur dioxide in the chemical wood-pulp industry. T. BLOMEN (*Paper Trade J.*, 1937, 105, TAPPI Sect., 192—194).—Data relating to the operation of a no. of Scandinavian mills are discussed. H. A. H.

Pulp from sugar-cane stalks. C. LEVI and E. DEBENEDETTI (*Zellstoff u. Papier*, 1937, 17, 473—474).—Attempts made in Italy to use the sugar-cane stalk residues obtained in the production of EtOH from sugar cane showed that a 40—45% yield of bleachable pulp was possible by acid, alkaline, and chlorination methods. It was necessary, however, to remove mineral dirt, of which there was a considerable quantity, as well as some of the short fibres and cells. Removal of these fibres and cells reduced the yield by 10%, and the resultant pulp is said to be similar to esparto. The max. beaten strength was at 50° S.R. D. A. C.

Bonding force of cellulosic materials for water (from specific volume and thermal data). A. J. STAMM and L. A. HANSEN (*J. Physical Chem.*, 1937, 41, 1007—1016; cf. B., 1935, 398).—The true d of cellulose from various sources has been measured by a displacement method using He. The vals. so obtained

are used in calculating the change of internal pressure of adsorbed H₂O. The initial bonding force of cellulosic materials for H₂O is about twice that of H₂O for itself. F. L. U.

The hollander and other precision beaters [for paper pulp]. K. BACHMANN (*Papier-Fabr.*, 1937, 35, 418—422).—Recent developments in beater design are described and the characteristics of the main types are given. D. A. C.

The kollergang. W. BRECHT (*Papier-Fabr.*, 1937, 35, 413—418).—The operating principle and the uses of the kollergang, as well as the history of its development, are sketched. D. A. C.

Determination of wetness and control of [paper-pulp] beating. E. MUNDS (*Papier-Fabr.*, 1937, 35, 422—424).—Methods of wetness determination for use in the control of beating are reviewed. D. A. C.

Beating process (hydration) [of cellulose material]. G. JAYME (*Papier-Fabr.*, 1937, 35, 409—413).—The literature is surveyed. The view is supported that "hydration" during beating arises from increase in external sp. surface due to fibrillation, and the introduction of capillary H₂O into the fibres, resulting in increased flexibility of, and more intimate contact between, the fibres. D. A. C.

Relation of temperature to the beating degree of pulps. A. NOLL (*Papier-Fabr.*, 1937, 35, 393—399, 401—408).—The effect of temp. during beating on the physical properties of bleached and unbleached pulp is investigated, using the Clark kollergang. In all cases rise in temp. from 20° to 50° markedly reduced the rate of strength development and gave a lower max. strength. Wetness (°S.R.) was similarly affected, but to a proportionately smaller extent. The change in beating properties could not be related to changes in the chemical composition of the pulp (presence of hemicellulose or gums), but closely followed, on the other hand, the change in swelling in 17.5% NaOH, which in turn was related to changes in the γ of the swelling medium. Since by beating in aq. NaCl under conditions of increased γ accelerated strength development was obtained, it is considered that the effects of temp. on beating are primarily due to reduction in γ of the aq. medium. The relation of temp. to the beaten properties of the pulp at const. beating time is linear; pulps are thus well differentiated and show, it is suggested, a new criterion. It is possible at the same time to determine the crit. temp. at which resin separates out. This is a measure of the pitching properties of the pulp, which are said to be governed by the m.p. and not by the chemical constituents of the pitch. D. A. C.

Absorption of alkali solutions by rayon pulp. M. FUJII (*J. Cellulose Inst. Tokyo*, 1935, 11, 184—192).—Data for the absorption of H₂O and 17.5 and 19% aq. alkali at 20° are recorded. The amount of absorption and the penetration height increase with increasing air space in the original pulp. The combination of NaOH with cellulose is of secondary importance. The absorption reaches its max. in a few min. CH. ABS. (e)

Effect of repeating analytical tests on the same sample of cellulose. L. BRISSAUD (Mém. Poudres, 1937, 27, 230—235).—For the same sample, the KOH no. (cf. Landon, B., 1934, 795) gave results $>$ those obtained when the time of heating with the reagents was prolonged. Similar modified results were obtained in a determination of α -cellulose by the Kirkelsilk Society's method with 17.5% NaOH, and in determinations of I val., Ag and Cu nos. In determinations of sol. matter in nitrocellulose (I) renewal of the surface by dissolving in CO_2 and pptg. with H_2O enabled further sol. matter to be extracted, and a mere washing of extracted (I) with H_2O also modified the surface sufficiently to permit further extraction. The phenomenon is caused by the action of swelling liquids followed by washings which cause the (I) to swell. Only slightly polymerised substances, which are easily sol., can thus come in contact with the reacting medium or dissolve. There is also, but to a smaller degree, a degrading action. To obtain accurate analytical results the conditions as to composition and temp. of reagents must be kept within close limits. Slight variations affect the surface of the cellulose and consequently the results.

W. J. W.

Paper and cellulose from straw. A. VAN DER WERTH (Zellstoff u. Papier, 1937, 17, 428—439, 469—472, 531—533).—A review of patent literature.

Report of [papermaking] fibre identification symposium. ANON. (Paper Trade J., 1937, 105, TAPPI Sect., 210—219).—A detailed investigation into the technique of fibre-staining for paper analysis, carried out by several workers, is described. The TAPPI standard method (T 401m) is abandoned, and a new tentative set of standard conditions is outlined. Particular attention is paid to the use of Graff's "C" stain (B., 1935, 489), and it is agreed that when certain closely controlled conditions are observed, the "C" stain is capable of differentiating between certain mixtures of fibres in a much more adequate manner than any other stain yet available; this applies especially to a variety of recently developed cellulose fibres which are the outcome of new methods of cooking, bleaching, and chemically refining wood pulps. Accuracy of $\pm 3\%$ is claimed.

H. A. H.

Starches in the paper industry. I. J. SAXL (Paper Trade J., 1937, 105, TAPPI Sect., 186—192).—Methods of evaluating starches for use in the paper industry are divided into two classes, viz., those concerned with its use as a filler and binder, and those which seek to determine its suitability as a surface-coating material. Apparatus for evaluating each property is described. Determinations of p_H and η are not sufficient to differentiate starches for either purpose.

H. A. H.

Comparison of different save-alls [in papermaking]. K. LINDOVSKY (Papier-Fabr., 1937, 35, 429—432).—A conical save-all, working in connexion with a small machine making mechanical and wood-free papers with 2—26% of ash, gave an average recovery of about 83%. This was considerably reduced, however, if frequent changes of make occurred because of the need each time for washing

out the cone. By interposing an Adka save-all between the conical one and the machine-wire pit, and passing the thickened stock from the Adka to the cone, the recovery was increased to an average val. of 97%.

D. A. C.

Permeability of membranes to water vapour, with special reference to packaging materials. F. T. CARSON (U.S. Dept. Comm., Nat. Bur. Stand. Misc. Publ. M 127, 1937, 19 pp.).—A survey of the literature shows that permeability measurements have been made by four distinct types of methods, with, however, widely varying testing conditions and units of expressing the results. The main characteristics of the different methods are tabulated; the reported results are discussed with a view of formulating a standard method, for which it is considered essential to provide a seal for preventing edge-leakage, and to control the temp. of the air during the test. % R.H. and the rate of diffusion of H_2O vapour through air may strongly influence the results. A suggestion for the mechanism of H_2O -transference through a membrane is put forward.

D. A. C.

Fundamentals of glassine [paper] transparency. I. Psychological. D. B. WICKER (Paper Trade J., 1937, 105, TAPPI Sect., 233—242).—Neither photographic nor visual classification of glassine papers for transparency is dependable except where fairly large differences are involved. Transparency increases progressively with the tendency of the paper to transmit light without scattering, and it is concluded that this property dominates all others in determining it. The concepts of transparency and opacity as applied to paper are analysed, and mathematical equations representing the visual reaction to changes in brightness contrasts when a printed surface is covered by a transparent sheet of paper are developed.

H. A. H.

Retention of dyestuffs on papermaking fibres under various conditions. W. D. HARRISON (Paper Trade J., 1937, 105, TAPPI Sect., 179—185).—By the application of Beer's law to spectrophotometric measurements of the back- H_2O , using the General Electric colour analyser, the retention of some 20 dyes on unbleached and bleached sulphite and kraft, bleached soda, groundwood, and rag pulps, under varying conditions of p_H , freeness, consistency, temp., and time of contact, has been determined. The procedure, involving the prep. of hand-made sheets, using the British pulp-evaluation sheet machine and suitable means for collecting the back- H_2O , from pulp dyed under standardised conditions, is described. Dye fixation was effected by the use of H_2SO_4 , in order to avoid errors due to the floc produced by $\text{Al}_2(\text{SO}_4)_3$, as in normal practice. A correction for the colour of white- H_2O from the corresponding undyed pulp was applied. Confirmation of the accuracy of the results was obtained by the application of the Kubelka-Munk equation to the spectrophotometric measurement of the dyed sheets themselves in a no. of typical cases. With direct dyes consistency, freeness, and time are the most important variables; with acid dyes p_H is most

important, but consistency and freeness also have some effect; with basic dyes the effects of consistency and freeness are again considerable, but the degree of lignification of the fibre is by far the most important factor. The effect of temp. (up to 60°) is in no case appreciable.

H. A. H.

Calculation of the spectral reflectivity of dyed [paper] hand[-made] sheets. P. NOLAN (Paper Trade J., 1937, 105, TAPPI Sect., 204—207).—The Kubelka-Munk equation is applied to predicting the spectral reflectivity val. of laboratory-made sized unbleached sulphite sheets, dyed with two non-interacting basic dyes, from that val. of sheets containing each individual dye, good agreement being obtained. The General Electric colour analyser was employed for the measurement of spectral reflectivity, the procedure being outlined. The theoretical conditions for the experimental observation of the difference between the spectral absorption coeffs. of a dye in aq. solution and that adsorbed on the fibre are discussed, methylene-blue being treated as a special case.

H. A. H.

Light-scattering materials [paper]. Gloss measurement.—See I. Coloured filaments in rayon spinning.—See VI. Road-binding material.—See IX. Stainless steels for textile etc. industries.—See X. Spectral analytical methods.—See XI. Bakelite fillers. Printing.—See XIII. Saccharification of spruce chippings.—See XVII.

See also A., II, 487, η of solutions of cellulose. K_m consts. of cellulose acetates. 510, Changes in resins during working of wood.

PATENTS.

Purification of raw wool. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 468,213, 30.12.35).—Wool is treated with a liquid or molten wool-fat solvent, *e.g.*, $C_{10}H_8$, p - $C_6H_4Cl_2$, together with metallic or $N(C_2H_5 \cdot OH)_3$ soaps etc. to lower the γ . After removing excess of solvent by centrifuging, squeezing, etc., the wool is mechanically treated at a temp. at which the solvent is solidified.

F. R. E.

Production of cellulose. I. G. FARBENIND. A.-G. (B.P. 468,388, 2.1.36. Ger., 13.2.35).—Vegetable fibrous material is treated with dil. HNO_3 (2—7 vol.-%) under reduced pressure at 40—60° and, while circulating the acid, the temp. is very gradually raised to 70—90°, the excess pressure of several atm. so produced being maintained until the end of the reaction; alternatively, the excess pressure may be created immediately after the introduction of the HNO_3 . The treated material is finally subjected to the usual alkaline after-treatment and washed.

F. R. E.

Production of cellulose esters. GEVAERT PHOTO PRODUCTEN N.V. (B.P. 467,954, 30.11.36. Austr., 5.12.35).—The pretreatment process is carried out with a min. of pretreatment liquid by pressing the cellulose and passing the liquid therethrough under pressure.

F. R. E.

Separation of an organic acid [cellulose] ester from its reaction mixture. C. J. MALM and C. R. FORDYCE, Asss. to EASTMAN KODAK CO.

(U.S.P. 2,063,322, 8.12.36. Appl., 23.3.34).—Lower fatty esters of cellulose are separated from the esterification mixture by pptg. with petroleum of b.p. 150—300° (150—200°), after neutralising mineral acid catalyst, rendering anhyd., and diluting with fatty acid if necessary. Acid and petroleum in the filtrate may be separated and recovered by adding H_2O .

A. H. C.

Treatment of cellulose and derivatives thereof. J. K. HUNT and G. H. LATHAM, Asss. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,060,733, 10.11.36. Appl., 4.9.34).—Deterioration of cellulose and its derivatives is prevented by impregnation with a substance, $NRR'CX \cdot YR''$ (R, R', and R'' are hydrocarbon radicals, or R and R' may be H; X and Y = S or O). *E.g.*, viscose rayon is immersed in 5% aq. $NH_2 \cdot CO_2Et$ or aq. or alcoholic $NHPh \cdot CO_2Et$.

R. S. C.

Felted fibrous cellulosic sheet product. A. F. BURGESS. From PAPER PATENTS Co. (B.P. 468,106, 7.8.36).—A no. of crêped sheets of gossamer thinness formed from a furnish containing 10—50% of brittle asphalt of m.p. 60—93° are impregnated with fire-proofing salts and superimposed to form a pad of heat- and sound-insulating material.

F. R. E.

Press for use in the treatment of cellulose sheets with alkaline lye. WEGELIN & HÜBNER, MASCHINENFABR. U. EISENGIESSEREI A.-G. (B.P. 473,547, 9.4.36. Ger., 11.4.35).—The sheets, arranged vertically, are soaked and pressed in the same place; the stationary abutment of the press forms part of the wall of the tank and is removed to discharge the sheets by further operation of the follower.

B. M. V.

Manufacture of cellulose derivatives and of shaped structures therefrom. L. LILIENTELD (B.P. 474,223, 24.1.36).—In the manufacture of alkali-sol., H_2O -insol. cellulose hydroxyalkyl ethers (I) having <1 (± 0.5) hydroxyalkyl per $C_6H_{10}O_5$, alkali-cellulose (II) prepared using aq. $NaOH$ of $<30\%$ ($\geq 25\%$) concn. is treated with the hydroxy-alkylating agent(s) at $\geq 15^\circ$ ($<5^\circ$); preferably, the other steps also, *e.g.*, shredding and maturing of (II) and ripening of (I), are carried out at $<15^\circ$. The coagulated products are claimed to have improved dry and wet tenacity and extensibility, and a lower H_2O -absorption. Application of the process to mixed ethers (*e.g.*, Me hydroxyalkyl) is claimed.

H. A. P.

Manufacture of [non-creasing] rayon [thread]. E. J. R. BEATTEY (U.S.P. 2,058,551, 27.10.36. Appl., 5.6.33).—A thread is formed of a larger core filament and smaller surrounding ones, and the core is caused to make contact with the hardening bath before the others, that being effected in a central well in the spinneret.

B. M. V.

Production of staple fibres. ING. A. MAURER SOC. ANON. (B.P. 467,888, 21.11.36. Switz., 5.12.35).—One or more fluid jets are directed on to the strand of artificial fibres from the spinning machine, so as to twist it into rope form and steady it prior to cutting to staple length.

F. R. E.

Production of artificial filaments, threads, films, and the like. A. C. CHIBNALL, K. BAILEY,

and W. T. ASTBURY (B.P. [A] 467,704 and [B] 467,812, 22. and 24.10.35 and 28.7.36).—A solution in aq. urea of (A) a vegetable globular protein (globulin) which has been artificially degenerated and/or denatured, or (B) casein, together with a "spinning auxiliary," *e.g.*, glyoxal polymeride, is extruded into a regenerating liquid consisting of H₂O or dil. aq. (NH₄)₂SO₄ or Na₂SO₄, with or without addition of acid, ZnCl₂, glycerol, sorbitol, or other "spinning auxiliary." The filaments etc. are after-treated with a solution of one or more "spinning auxiliaries," with aq. CH₂O, K₂Cr₂O₇, alum, etc., or with a solution of paraffin wax in EtOH etc., and stretched during the spinning or after-treatment. F. R. E.

Manufacture of paper pulp. L. L. LARSON and G. L. SCHWARTZ, Assrs. to E. L. DU PONT DE NEMOURS & Co. (U.S.P. 2,049,567, 4.8.37. Appl., 5.6.34.).—The wood chips are cooked (by acid or alkaline methods) with liquor containing 0.001–1% of a wetting agent the wetting properties of which are unaffected at high temp. [*e.g.*, an alkyl-naphthalene-sulphonate (alkyl < C₅)]. D. A. C.

Refining of wood pulp. A. H. STEVENS. From CANADIAN INTERNAT. PAPER Co. (B.P. 468,306, 9.5.36).—Bleached or unbleached pulp is treated at high density (*e.g.*, 30%) with a small excess of free NaOH (*p_H* usually 8–9) and a wetting agent (sulphonated oils and alcohols). The treatment is carried out at 65–75° for about 3 hr., when the pulp is washed free from reaction products. Resins and residual colouring matter are thereby removed. D. A. C.

Treatment of bleached pulp. G. H. TOMLINSON (U.S.P. 2,049,676, 4.8.36. Appl., 13.2.34.).—Pulp, particularly kraft or soda, which has been bleached by alkali hypochlorite methods, is slightly acidified with H₂SO₄ containing an antichlor (SO₂), and bleached in neutral solution with min. quantities of free HOCl (*e.g.*, produced *in situ* with Cl₂ and CaCO₃). Removal of residual colouring matter, which would otherwise require drastic treatment by normal bleaching methods, is claimed. D. A. C.

Manufacture of paper. A. E. H. FAIR (B.P. 467,691, 24.2.36).—White-H₂O and/or filler are/is added to the web on the Fourdrinier wire by spraying on to an inclined shield placed at right-angles to the direction of travel of the wire. The shield has vertical corrugations, and at its lower edge a rubber lip from which the H₂O flows in a film on to the web. Saving in white-H₂O and filler, and, if desired, production of a "one-sided" paper, are claimed. D. A. C.

Paper manufacture. H. R. RAFTON, Assr. to RAFFOLD PROCESS CORP. (U.S.P. 2,049,864, 4.8.36. Appl., 29.10.32.).—Paper containing alkaline fillers (*e.g.*, CaCO₃) is sized with a saponifiable agent which is in substantially unsaponified form (*e.g.*, rosin) and may be mixed with casein. Alum is added to the stock at a point (*e.g.*, the breast box) in the flow system where its time and intimacy of contact with the stock are at a min. The size may be added either in the beater or to the formed web on the paper machine. D. A. C.

Manufacture of paper and paper board. L. M. BOOTH (U.S.P. 2,050,262, 11.8.36. Appl., 20.7.32).—Small quantities of alkali, not sufficient to neutralise all the alum present, are added to the pulp after it has been diluted for sheet-forming and just prior to feeding on to the paper-machine wire. It is intended thus to prevent CO₂ evolution, as a result of interaction of the alum and the hardness in the process-H₂O, by HCO₃' formation. D. A. C.

Decalcomania paper and transfer. F. W. HUMPHNER, Assr. to MID-STATES GUMMED PAPER Co. (U.S.P. 2,050,795, 11.8.36. Appl., 4.5.35).—Sheets of transfer paper having a H₂O-sol. adhesive coating with a lacquer coating superimposed are divided into segments which are made easily detachable, on moistening, by thinning the lacquer layer at the segment boundaries. This may be done by printing the boundaries with a lacquer solvent, or embossing the paper before lacquering. D. A. C.

Manufacture of carbon paper. J. BURGMER (B.P. 467,880, 2.9.36).—With the use of cheap and porous body papers, the web is supported at the point of the colour application by an endless moving band which will take up the colour pressed through the web. The colour may be recovered by heating and doctoring the band. Alternatively, the colour may be taken up by the same web of paper arranged to pass the applying roll twice, itself receiving the colour at the second pass. D. A. C.

Production of [looped] textile threads. K. F. SEIM (B.P. 474,173, 12.8.36. Ger., 12.8.35).

Processes and [corrugating] apparatus for imparting stretchability to webs. F. R. TATE. From PAPER SERVICE Co. (B.P. 475,485, 17.2.36).

[Rollers for] manufacture of artificial silk. VEREIN. GLANZSTOFF-FABR. A.-G. (B.P. 474,570, 23.3.37. Ger., 23.3.36. Addn. to B.P. 423,090).

Dyed cellulosic material. Water-repellent textiles.—See VI. Sandpaper.—See VIII. Measuring colour change.—See XI.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Application and action of peroxides on textiles. F. OHL (Kunstseide, 1937, 19, 354–358).—A general account is given of the use of H₂O₂ in bleaching. Lenkofix and Pentazikon TB are more efficient stabilisers than is water-glass. Data are recorded for the loss of strength of various yarns after a variety of treatments with H₂O₂. A. G.

De-fogging the dyehouse. J. F. SPRINGER (Rayon Text. Month., 1937, 18, 614–616, 702–704).—It is recommended to blow in heated air at two levels, the lower to evaporate the condensed H₂O and the upper to prevent condensation on the roof. A. G.

Temperature control in acetate[-silk] dyeing. E. H. HAMMOND and C. B. ORDWAY (Rayon Text. Month., 1937, 18, 612–614, 684–685).—Automatic temp. control ensures reproducibility of dyeings and increases the output per machine. A suitable installation is described. A. G.

Scouring, dyeing, and finishing of automobile head-lining [fabrics]. W. F. DEADY (Amer. Dyestuff Rep., 1937, 26, 559—562).—Methods and machinery for the continuous dyeing (with S dyes) and finishing of cotton fabric are described. A. J. H.

Staple fibre, staple fibre mixtures, and their dyeing. W. BRÜCKHAUS (Kunstseide, 1937, 19, 330—335).—A general article. Staple fibre requires bleaching only when full-white or very bright shades are required; either the Cl_2 or H_2O_2 process can be used, or, in admixture with wood, the KMnO_4 or H_2O_2 process. When dyeing with direct colours addition of alkali should be avoided. A. G.

One-bath indigosol process in piece and skein dyeing. K. NEUMANN (Kunstseide, 1937, 19, 329—330).—Indigosols of good substantivity can be dyed by the one-bath process; indigosol-blue IBC can be so dyed in presence of NH_4OAc , which partly hydrolyses the ester to a highly substantive intermediate product. A. G.

Dyeing rayon. H. H. MOSHER (Canad. Chem. Met., 1937, 21, 331—333, 339).—Crêpe fabric should pass first through warm dil. NaOH or KOH which causes the fibres to swell and develops the pebble, and then through a bath of soap or its equiv. and a CaO -dispersing agent, a penetrating agent, and a softener. Addition of an assistant to the dye bath promotes dye absorption by increasing dye dispersion; the assistant is usually absorbed by the fibre and improves its handle. A. G.

Producing coloured filaments in rayon spinning. G. LEPAGE (Rayon Text. Month., 1937, 18, 681—682).—The best results are obtained by the use of the leuco-vat dye esters, the filaments so obtained appearing homogeneously coloured under the microscope. Uses of such filaments are described. A. G.

Quantitative investigation of the different direct-dye absorptions of bleached cotton, viscose rayon, and viscose staple fibres. DRATHEN, HAVEKOST, and RUSCHEWEYH (Textilber., 1937, 18, 915—918).—Cotton, viscose rayon, and Vistra (viscose staple fibre) have affinities for direct dyes which increase in the order named, but by quant. measurements with five dyes (these yield aq. solutions of five degrees of dispersion) it is shown that these differences decrease as the dye dispersion and the dye liquor concn. increase and decrease, respectively. A. J. H.

Slubbing dyeing. E. ISLES (J. Soc. Dyers and Col., 1937, 53, 417—424).—The development of synthetic dyes is reviewed with reference to the influence on slubbing dyeing, and the use of various types of dyes and dyeing machinery and the fastness properties required in dyed slubbing are discussed, suitable methods for testing fastness to scouring and milling, cross-dyeing, and light being given. Problems in dyeing due, e.g., to dissimilar dyeing properties of different wools, presence of alkali, etc. are also referred to. For the bleaching of slubbing, H_2O_2 is more effective than SO_2 . R. J. W. R.

Colours and gums used in textile printing. I. F. CHAMBERS (Trans. Amer. Soc. Mech. Eng., 1937, 59, 741—744).—A review. R. B. C.

Use of glycerin-A in [textile] printing. A. SCHNEEVOIGT (Textilber., 1937, 18, 919—920).—Glycerin-A (I.G.) is a cheaper substitute for glycerol and acetin, and is a powerful dispersing agent for numerous basic, acid, vat, and Rapidogen dyes (specified). A. J. H.

Soaping cotton prints. F. L. TAYLOR (Text. World, 1935, 85, 2440—2441).—Methods are described for correcting faults in Naphthol and NH_2Ph -black prints which failed to clear up on soaping.

Application of synthetic resins in textile finishing. D. H. POWERS (Rayon Text. Month., 1937, 18, 686—687).—The uses of resin finishes on cotton and rayon fabrics is described. A. G.

Rôle of catalysis in textile chemistry. II. H. J. HENK (Textilber., 1937, 18, 918—919).—The properties of enzyme catalysts (I) are described and compared with those of the inorg. catalysts described previously (B., 1937, 1194). (I) are especially influenced by four types of activators. *Bac. mesentericus* and *B. subtilis* have a strong disintegrating action on wool; trypsin (II) is active towards wool only after breaking of the cystine (S:S) linking by previous chemical attack and at the optimum p_{H} (8.5). The disintegration products of wool attacked by (II) are capable of reducing vat dyes so as to produce "flecks" in vat-dyed materials. Pre-swelling of the wool fibre has no influence on the attack by (II).

Laboratory methods for desizing cotton materials. R. E. HOWELL (Amer. Dyestuff Rep., 1937, 26, 342—345P).—The malt-enzyme, acid-alkali, and $(\text{NH}_4)_2\text{S}_2\text{O}_8$ methods are discussed and improvements of detail suggested. A. J. H.

[Cotton] mercerisation. III. Effect of temperature and caustic soda impurities. S. M. EDELSTEIN (Amer. Dyestuff Rep., 1937, 26, 423—427P; cf. B., 1937, 1327).—Results obtained in the examination for (direct) dye affinity, tensile strength, extensibility, lustre, and Ba-absorption of cotton yarns mercerised under const. tension with aq. NaOH of d 1.150, 1.175, 1.250, and 1.325, and at 15°, 32°, and 43°, are given. Lowering of the temp. of mercerisation increases the contractive force of the yarn and also its affinity for dyes and Ba-absorption, these effects for d 1.150 and 1.175 being $>$ those for d 1.250 and 1.325. In mercerising with solutions of d 1.150 and 1.175, lowering of temp. gives the yarn a considerably higher lustre, but with those of d 1.250 and 1.325 the corresponding effect is very small. Commercial mercerising liquors may contain $>4\%$ of Na_2CO_3 and fats and pectic impurities removed from the cotton. These impurities in aq. NaOH of d 1.25 diminish the usual increase of dye affinity and lustre, but do not influence the other three properties. A. J. H.

Mercerisation of staple fibre. K. HEIDE (Kunstseide, 1937, 19, 314—323).—Staple fibre may be mercerised in aq. NaOH of d 1.04—1.06 or d 1.18—1.26; intermediate concns. are dangerous. The low concn. is used to produce improved dyeing or finishing properties, to increase the crimp and facilitate spinning, or to diminish the lustre. The higher

concs. are used for mixtures with cotton, and to prevent damage NaCl is added to the aq. NaOH and this is applied at a slightly raised temp. Details of practical processes are given. A. G.

Cellulose dye compounds.—See IV. **Dyes in papermaking.** **Determining swelling of fibrous materials.**—See V. **Stainless steels for textile etc. industries.**—See X.

PATENTS.

Dyeing of cellulose textiles. I. G. FARBENIND. A.-G. (B.P. 474,778, 7.5.36. Ger., 9.5.35).—Cellulosic textiles, e.g., cotton and regenerated cellulose silk, are dyed with the sulphonic acids of metal-containing and metal-free phthalocyanines. The fastness of the dyeings to H₂O is further improved by treatment with amines of high mol. wt. (cf. B.P. 366,918, 390,218, 390,553, 398,175; B., 1932, 544; 1933, 617, 667, 961). In examples, cotton (50) is dyed blue of excellent fastness to light in a bath of Cu, Co, or Ni phthalocyaninesulphonic acid (1) with Na₂CO₃ (1) and Na₂SO₄ (10) dissolved in H₂O (1000) at 80–90° during 1 hr. Similarly viscose silk (40) is dyed for 1 hr. at 85–90° with Cu phthalocyaninesulphonic acid (0.8) and Na₂SO₄ (20) dissolved in H₂O (1000 pts.).

K. H. S.

Manufacture of dyed cellulosic material. I. G. FARBENIND. A.-G. (B.P. 474,796, 27.5.37. Ger., 31.5.35. Addn. to B.P. 474,778; preceding).—Cellulosic materials other than textiles, e.g., raw material for paper, films of regenerated cellulose, straw, linters, cotton wool, are dyed in even and brilliant shades of good fastness with phthalocyaninesulphonic acids. In examples, bleached sulphite pulp is dyed with 1% Cu phthalocyanine Na sulphate, or paper is dyed by passage through a solution of Cu phthalocyaninesulphonic acid (30) in H₂O (1000 pts.) at 40°, or a film of regenerated cellulose is passed during 2 min. through a 1% solution of metal-free phthalocyanine Na sulphate at 100°. Blue dyeings are obtained.

K. H. S.

Mordanting and dyeing furs. COMP. NAT. DE MAT. COL. ET MANUF. DE PROD. CHIM. DU NORD RÉUNIES ETABL. KULHMANN (B.P. 474,589, 11.6.37. Fr., 16.6.36).—Furs to be dyed are mordanted with Fe^{III} lactate (I), which confers on the long and hard hairs the same affinity for dyes as the short hairs. Among examples, a white long-haired rabbit skin is treated for 12 hr. at room temp. in a bath of (I) (1), 6% aq. AcOH (2), and H₂O (1000) and then dyed for 4 hr. in a bath of *p*-C₆H₄(NH₂)₂ (II) (0.3), *p*-NH₂-C₆H₄-OH (III) (1.5), 1 : 2 : 3-C₆H₃(OH)₃ (0.32 g.), and 12 vol. H₂O₂ (21.2 c.c.) in H₂O (1000); the points are then brushed once with a solution of (II) (9), (III) (4 g.), 12 vol. H₂O₂ (300), and H₂O (700 c.c.). The imitation sable has the long hairs regularly dyed and resistant to rubbing.

K. H. S.

Production of [stiffened, shaped] textile articles. BRIT. CELANESE, LTD. (B.P. 468,099, 29.6.36. U.S., 29.6.35).—A no. of layers of fabric, at least one of which contains a cellulose derivative, is simultaneously shaped and laminated by heat and pressure in presence of an aq. medium (H₂O, steam

and a plasticiser while the cellulose derivative is at least partly plastic. F. R. E.

Production of stiffened fabrics and articles made thereof. BRIT. CELANESE, LTD. (B.P. 475,003, 14.9.36. U.S., 14.9.35. Addn. to B.P. 452,296).—Fabrics containing a thermoplastic cellulose derivative (I), e.g., the acetate, are stiffened by applying heat and pressure in presence of a plasticiser which may be an arylsulphonamide (the *p*-ethyl-toluene compound), an alkoxy-ester of a polybasic org. acid [*o*-C₆H₄(CO₂[CH₂]₄·OH)₂], a polyhydric org. acid ester of a monoalkyl ether of a polyhydric alcohol [*o*-C₆H₄(CO₂[CH₂]₂·OEt)₂], an alkyl, aryl, or aralkyl ester of H₃PO₄, [(OEt·[CH₂]₂)₃PO₄], (C₆H₄Me)₃PO₄, or (C₆H₄Me)₂(OEt·[CH₂]₂)PO₄, triacetin, diacetin, or camphor. A volatile liquid (II) (MeOH, EtOH, Pr²OH) which develops solvent properties for (I) at elevated temp. is also present, preferably as an aq. solution containing 55–90 (80)% of (II). Two layers of fabric with an intermediate layer containing (I), or vice versa, may be united. R. G.

Rendering textiles water-repellent. FÄRBEREI A.-G. VORM. E. STOLTE NACHFOLGER & W. MISSY (B.P. 474,403, 1.5.36. Ger., 2. and 18.5., 10.10., and 28.12.35, and 19.2.36).—Textiles containing wool, cellulose, or cellulose derivatives are rendered H₂O-repellent by superficial reaction with carbimides R·CO·NCO, where R is aralkyl with a saturated alkyl residue of < C₁₀, cycloalkyl, alkyl, or a saturated or unsaturated sterol alcohol. These radicals may be further substituted. The carbimides may also be added to acetylcellulose spinning solution. Interaction with the fibre is caused by heating at about 100° for a short time. Fatty acid azides containing < C₁₀ may be used similarly. Among examples, a printed viscose crêpe is passed through a 0.5% solution of C₁₈H₃₇·NCO (I) in light benzene and then heated for 1 min. at 100° and for 2 min. at 140°. Similarly cotton is treated with C₂₇H₅₅·NCO and heated for 2 min. at 150°. Other substances quoted in examples are C₁₂H₂₅·NCO, C₂₉H₄₁·NCO, C₁₇H₃₅·CO·O·C₆H₄·NCO, and C₂₇H₄₅·O·CO·[CH₂]₄·CON₃. Further, (I) (800 g.) is added to 20% acetylcellulose solution in COME₂ (100 litres) to afford H₂O-repellent filaments when spun.

K. H. S.

Treatment of textiles. I. G. FARBENIND. A.-G. (B.P. 475,039, 8.5.36. Ger., 8.5.35).—The materials are treated with aq. solutions of diguanides NH₂·C(NH)·NH·C(NH)·NRR', where R and R' are hydrocarbon radicals or substitution products thereof, or R may be H, and particularly where at least one of these radicals comprises a straight, branched, or cyclic chain of >6 C. These products are wetting agents etc. R. G.

Starch preparation [for textiles]. L. MEL-LEERSH-JACKSON. From ULTRAZELL G.M.B.H. (B.P. 472,473, 17.3.36).—The effects of bleaching or blueing linen etc. are obtained without risk of damage by adding sol. fluorescent substances, e.g., 1% of β-methylumbelliferone, to the starch during dressing.

R. S. C.

Production of transparency effects on cotton. W. J. TENNANT. From RADUNER & Co. (B.P.

474,419, 27.4.36).—Transparency effects are produced on cotton fabrics by impregnation with a viscose solution, followed by immersion in a pptg. bath and mercerisation. The fabric may also be treated before or after mercerisation with aq. H_2SO_4 of d 1.53, whilst prior to the acid treatment ester salts of leuco-vat dyes together with oxidising agents may be applied, preferably along with the viscose. Reserves, e.g., rubber, may be printed before impregnation. Among examples, a mousselin fabric is impregnated several times with a ripened 2—8% alkaline viscose solution, squeezed, passed through a pptg. bath of 10% aq. Na_2SO_4 and 18% aq. H_2SO_4 , and then mercerised under tension with aq. $NaOH$ of d 1.28 at 0° for 20 sec. K. H. S.

Jigger machines for dyeing. J. DEAN, jun., and J. DEAN (B.P. 475,325, 28.4.37).

[Reversal] control of washing or dyeing machines. LAUNDRY AUTOMATIC APPLIANCES, LTD., and S. H. RIBBANS (B.P. 473,161, 7.7.36).

Dye intermediates.—See III. **Bleached pulp.**—See V. **Treating hair.**—See XX.

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

Production of sulphuric acid by the contact process and by the lead-chamber process. (A) H. PETERSEN. (B) W. SIECKE (Metall u. Erz, 1937, 34, [A] 584—586, [B] 586).—Reviews.

E. S. H.

Manufacture of sulphuric acid by the method of "wet catalysis." P. M. LUKIANOV (J. Chem. Ind. Russ., 1937, 14, 1236—1240).—The method, involving contact oxidation of SO_2 in presence of steam, is recommended. R. T.

Nature of solid impurities in the circulating acids of the tower process; causes of their formation or introduction into the system. G. D. PASCHTSHEVSKI and E. I. SAVINKOVA (J. Chem. Ind. Russ., 1937, 14, 1153—1160).—The gas leaving the pyrites burners contains approx. 3 g. of dust per cu. m., which is only partly removed by Cottrell traps. This dust originates largely from inert material present in the pyrites, and undergoes absorption in the first two Glover towers. The suspended phase contains SiO_2 , Al_2O_3 , Fe_2O_3 , and PbO (from the Pb lining of the conduits and walls), whilst the material dissolved by the H_2SO_4 consists of Al_2O_3 , Fe_2O_3 , As_2O_3 , and CaO . Contamination of the acid may be minimised by using exclusively flotational pyrites, and by applying more efficient dust removal. R. T.

Optimum concentration of sulphur dioxide in the contact process of sulphuric acid production. G. K. BORESKOV and T. I. SOKOLOVA (J. Chem. Ind. Russ., 1937, 14, 1241—1250).—The velocity of oxidation of SO_2 at a V catalyst at 470° is $\propto [O_2]$, $[SO_2]^{0.8}$, and $[SO_3]^{-0.8}$, over the range SO_2 3.7—22.9 and O_2 6.5—40%. The energy of activation is calc. to be 23,000 g.-cal. The optimum $[SO_2]$ varies with the $[O_2]$, and this with the nature of the source of the SO_2 ; thus for ordinary pyrites gas max.

oxidation is obtained with 7%, for carboniferous pyrites with 5—6%, according to the C content, and for S with 8.2% SO_2 . Higher concns. of SO_2 can be used provided that the gas mixture is enriched with O_2 . R. T.

Determination of viscosity and density of industrial caustic alkali solutions. A. I. SEVTZOV (J. Appl. Chem. Russ., 1937, 10, 1500—1503).—The d of crude $NaOH$ solutions at 15—95° is given empirically by $1.0335 - 0.0005t + 0.01C$, where t is the temp. and C the % concn. of $NaOH + Na_2CO_3$. The η of such solutions is given by $(1/\varphi)(1 + at + \beta t^2)/T'$, where φ , α , and β are consts. for a given concn. of $NaOH + Na_2CO_3$, and t and T' are the temp. in °C. and °K. R. T.

Inactivation of ammonia catalysts by lubricating oils. V. P. KAMZOLKIN and V. D. LIVSCHITZ (J. Chem. Ind. Russ., 1937, 14, 1225—1229).—Inactivation of magnetite catalyst by lubricating oil in the gas varies parallel with oil concn. and pressure, and inversely with temp. The effect is due to the action of the products of decomp. of the oil, and the velocity of inactivation is \propto the rate of penetration of these products into the catalyst granules; for this reason the use of large granules is recommended when the gas is grossly contaminated with oil. R. T.

Design and operation of modern lime works. VII, VIII. **Gas-fired kilns.** IX. **Miscellaneous shaft kilns.** N. V. S. KNIBBS (Cement and Lime Manuf., 1937, 10, 240—248, 274—286, 301—310; cf. B., 1937, 1043).—VII. The theory of CaO -burning in gas-fired kilns is discussed.

VIII. Details of gas-fired kilns are described, with particular reference to methods of applying the gas, height of kilns, shape of the burning zone, use of producer gas, natural gas, and blast-furnace gas, and the operation of typical gas-fired kilns.

IX. Kilns fired by semi-gas, oil, and coal dust, and static kilns are discussed. T. W. P.

Chloride volatilisation of lithium from spodumene. F. FRAAS and O. C. RALSTON (U.S. Bur. Mines, Rept. Invest. 3344, 1937, 11 pp.).—Li can be volatilised almost completely as $LiCl$ by heating the finely-ground mineral with 33% of $CaCl_2$ and 1—3 times its wt. of $CaCO_3$ at 1000—1200°. The fume is readily condensed in a Cottrell plant and the $LiCl$ may be extracted with H_2O and converted into Li_2CO_3 by heating the solution with NH_3 and CO_2 . The filtrate from this treatment is boiled with CaO to recover NH_3 , and the aq. $CaCl_2$ (which contains a little $LiCl$) is evaporated and used again. A. R. P.

Regeneration of precipitating baths. A. PAKSCHVER, M. MARGULIS, and M. KAMISCHAN (Prom. Org. Chim., 1937, 4, 4—8).—The liquor is saturated at 40° with respect to Na_2SO_4 , cooled to 10°, and the $Na_2SO_4 \cdot 10H_2O$ separating is collected after 6—7 hr. and dehydrated in a rotating oven. R. T.

Crystallisation of potassium chromium alum. S. K. TSCHIRKOV (J. Chem. Ind. Russ., 1937, 14, 1257—1263).—The rate of crystallisation of K Cr alum (I) is \propto the $[H_2SO_4]$ of the solution and the concn. of (I). The optimum temp. rises with increasing $[H_2SO_4]$, to a max. characteristic of each $[H_2SO_4]$;

the val. of this max. rises with time from the beginning of crystallisation. The highest yields of (I) are obtained by commencing crystallisation at 26°, and gradually raising the temp. by 1—2° daily for 2—3 days, and thereafter by 0.2—0.5° daily, to a final temp. of 31—34°. Presence of Na₂SO₄ slightly retards crystallisation, whilst NaCl and K₂Cr₂O₇ have no effect. R. T.

Explosivity of systems containing potassium permanganate or dichromate and combustible substances. I. F. BLINOV (J. Chem. Ind. Russ., 1937, 14, 1151—1153).—K₂Cr₂O₇-S, -sawdust, or -C₁₀H₇·NO₂ mixtures do not exhibit explosive properties. The sensitivity to detonation (by heat, shock, friction, or H₂SO₄) of such mixtures with other oxidising agents rises in the order KClO₃ < KMnO₄ < KClO₄. The detonation temp. of KMnO₄-NH₄NO₃ mixtures varies parallel, and the force of the explosion inversely, with the [NH₄NO₃]. R. T.

Electrolytic preparation of ammonium persulphate. II. Balance of electrical energy. V. V. STENDER and B. I. SKIRSTIMONSKAJA. III. Electrode cell. V. V. STENDER and I. G. SHORNI-TZKI (J. Appl. Chem. Russ., 1937, 10, 1339—1351, 1352—1354; cf. A., 1937, I, 568).—II. The velocity of the side reaction H₂O₂ → H₂O + O, in the electrolytic oxidation of (NH₄)₂SO₄, falls with increasing [H₂SO₄] of the electrolyte, and is inhibited by NH₄CNS. The velocity of the processes H₂S₂O₈ + H₂O → H₂SO₄ + H₂SO₅; H₂SO₅ + H₂O → H₂SO₄ + H₂O₂; H₂SO₅ + H₂O₂ → H₂SO₄ + H₂O + O₂; H₂SO₅ + O → H₂SO₄ + O₂ varies inversely with the [H₂SO₄], that of direct decomp. of (NH₄)₂S₂O₈ with production of NH₄HSO₄ is ∝ [(NH₄)₂S₂O₈] and to the [H₂SO₄], and those of production and diffusion of O₂ are independent of the [H₂SO₄]. The highest yields of (NH₄)₂S₂O₈ were obtained with an electrolyte containing (NH₄)₂SO₄ 300, H₂SO₄ 225, and NH₄CNS 0.5 g. per litre.

III. A cathode cell, consisting of a perforated Pb cup separated from the electrolyte by a non-porous ebonite diaphragm, is described. Max. yields of 75—89% of (NH₄)₂S₂O₈ are obtained. R. T.

Utilisation of rocks and residues low in copper. H. WÖBLING (Metall u. Erz, 1937, 34, 477—478).—Low-grade Cu carbonate ores yield the greater part of their Cu content after extraction with aq. NH₃; the residue has a high CaCO₃ content and forms a valuable fertiliser for acid soils deficient in Cu. Low-grade German silicious Cu ores yield 90% of their Cu content after leaching with dil. H₂SO₄, and the residue can be used as a heat-insulating material or for making refractory bricks. A. R. P.

Choice of indicator in determining the alkalinity of ashes. S. LEMOYNE (Bull. Assoc. Chim. Sucr., 1937, 54, 517—521).—Me-orange is preferable to Me-red for this purpose. In the cold the latter is unsuitable for titration of carbonates, and at b.p. it gives no definite end-point if Ca phosphate is present. In the titration of H₃PO₄, whether with alkali or alkaline-earth hydroxides, in the cold or at b.p., Me-orange indicates the primary salt stage. The same applies to Me-red in the cold; at b.p., however,

it applies only to titrations with alkali hydroxides, whilst CaH₄(PO₄)₂ can be largely or completely converted into insol. Ca₃(PO₄)₂ before Me-red shows a permanent yellow colour. CaH₄(PO₄)₂ is in fact slightly alkaline to Me-orange and acid to Me-red. J. H. L.

Alunite. I. Y. ASADA (Bull. Inst. Phys. Chem. Res. Japan, 1937, 16, 1099—1129).—The thermal decomp. curves of various kinds of alunite have been compared by means of the thermobalance. J. W. S.

Interaction of alunite and aqueous ammonia. K. UCHIDA (J. Electrochem. Assoc. Japan, 1935, 3, 288—289).—Data for the attack of alunite by 8.33% aq. NH₃ in a bomb at 80—130° are recorded.

CH. ABS. (e)

Recovery of alumina and fertilisers from Chinese alunite. III. (E) Extractability of natural alunite with potassium hydroxide. G. HOHORST and H. HSIANGLIN. (F) Extraction of alumina with sodium hydroxide after recovery of potash and sulphur trioxide with ammonia. G. HOHORST and W. HSIAO-HAI (J. Chem. Eng. China, 1937, 4, 227—233, 234—247; cf. B., 1937, 904).—(E) Best extraction of unignited alunite requires < 12N-KOH in 13% excess. By treatment for ½ hr. at 80° yields of > 96% of Al₂O₃, SO₃, and K₂O are obtained. The SiO₂ content in dissolved Al₂O₃ is 0.32%; the Fe₂O₃ content of the solution is < 0.01%.

(F) In extraction of ignited alunite with 12.5% aq. NH₃ the heat of reaction may be usefully employed, the temp. rising to 70°, with > 94% extraction of SO₃. Treatment of the residue with NaOH at 80°/1 atm., the Na₂O : Al₂O₃ ratio being 1.7—1.8 : 1 mol., dissolves > 93% of the Al₂O₃. The solution is suitable for Al₂O₃ recovery by stirring after seeding (Bayer process) (70—77% yield). The average SiO₂ content of the solution is 0.55 g./litre. Extraction under pressure increases the formation of insol. Na Al silicate. The [NaOH] is not crit.; solid may be added to the residue, or used solutions employed for extraction purposes. Ni apparatus is suitable. The product is practically free from Fe, and the SiO₂ content is sufficiently low for metallurgical purposes. I. C. R.

Asbestos. G. E. HOWLING (Imperial Inst., 1937, 88 pp., 2nd Edn.).—Its distribution, mining, dressing, and uses are reviewed. R. B. C.

Conditions of preparation and use of copper-nickel catalyst. G. M. KLEIN, N. A. KAMNSKI, M. D. LITVINOV, and N. A. FEDOROVITSCH (Maslob. Shir. Delo, 1937, No. 3, 9—12; No. 4, 31—34).—The most active catalysts contain Cu : Ni : kieselguhr = 1 : 3 : 4. Cu and Ni are pptd. as carbonates at 40° on kieselguhr from a solution containing 5 g. of Cu + Ni per litre, with stirring, the ppt. being washed and then dried at 100—110°. The catalyst is suspended in oil and reduced with H₂, lowering the temp. gradually from 220° to 60°, the oil is filtered, and the residue added to unsaturated oil in amounts > 1.5—2%. Presence of > 0.3% of Fe, or of traces of Zn, inhibits the activity of the catalyst. R. T.

Fixation of sulphur from smelter smoke. A. Present status. R. S. DEAN. B. Vapour

pressure and thermodynamic properties of ammonium sulphites. H. W. ST. CLAIR. *C. Recovery of sulphur in solid compounds by addition of ammonia and water vapour to smelter gas.* G. W. MARKS and P. M. AMBROSE. *D. Diethylenetriamine and other amines as agents for recovery of sulphur dioxide.* G. W. MARKS and P. M. AMBROSE. *E. Oxidation of ammonium sulphite solution.* F. S. WARTMAN (U.S. Bur. Mines, Rept. Invest. 3339, 1937, 3—18, 19—29, 31—40, 41—46, 47—51).—(A) Recent work on the recovery of S from smelter gases is critically reviewed; no satisfactory results can be obtained without preliminary concn. of the SO_2 . This may be effected by scrubbing with aq. $(\text{NH}_4)_2\text{SO}_3$ — NH_4HSO_3 , basic Al sulphate, or xylydine, but in all three processes the SO_4^{--} produced by air oxidation must be removed either as CaSO_4 or as Na_2SO_4 . Possible modifications of, and alternatives to, these processes are discussed.

(B) From theoretical considerations it is deduced that the use of NH_3 in dust settling and SO_2 recovery from smelter gases is practical only at fairly low temp.; the best results should be obtained when the conditions favour the formation of NH_4HSO_3 , i.e., when the gas is saturated with H_2O vapour and the temp. is $<55^\circ$. Elimination of excess of moisture inhibits oxidation to SO_4^{--} and $\text{S}_2\text{O}_6^{--}$.

(C) Small-scale tests confirm the validity of the conclusions deduced in B.

(D) Aq. $\text{NH}(\text{C}_2\text{H}_4\cdot\text{NH}_2)_2$ (I) and triethylenetetramine are good absorbents for SO_2 up to 95° and the greater part of the gas is evolved on boiling. A cyclic apparatus for studying the efficiency of these solutions is described and some results obtained with 15% aq. (I) are recorded.

(E) The rate of oxidation of aq. $(\text{NH}_4)_2\text{SO}_3$ is limited by the rate at which it absorbs O_2 , whereas that of aq. NH_4HSO_3 is limited by the rate at which the salt reacts with dissolved O_2 . Under static conditions the best inhibitors of oxidation of these solutions are gallic acid, tannic acid, pyrocatechol, pyrogallol, metol, and quinol. A. R. P.

New applications of the two-phase method of reducing sulphur dioxide. K. F. PAVLOV and A. V. AVDEEVA (J. Chem. Ind. Russ., 1937, 14, 1231—1232).—Gas of low $[\text{SO}_2]$ and $[\text{O}_2]$ such as is obtained from production of cement from gypsum, or from electric furnaces for roasting Ni ores, is best utilised by passing the gas through coke ($\text{SO}_2 + \text{C} \rightarrow \text{CO}_2 + \text{S}$), and then passing the residual gas over bauxite catalyst at 400 — 700° . R. T.

Production of chlorine and saltpetre by the action of nitric acid on chlorides. B. B. VASSILIEV and J. A. RAVDIN (J. Chem. Ind. Russ., 1937, 14, 1136—1150).—Conc. HNO_3 and NaCl (3 mols. of HNO_3 per mol. of NaCl) are heated at 100° for 2.5—3 hr., the solution is conc., and NaNO_3 allowed to crystallise; the mother-liquor contains NaNO_3 6—7, HNO_3 45—46, and HCl 0.5%, and is returned to the process after adding HNO_3 to 65%. The gas evolved, containing Cl_2 60 and NOCl 35%, is compressed at low temp. to remove NOCl , and the residual Cl_2 is freed from N oxides by passing through conc. H_2SO_4 , and liquefied. The NOCl is converted into NO_2

and Cl_2 by passing through 65% HNO_3 , in a current of air. NO_2 is absorbed in H_2SO_4 , and the residual Cl_2 utilised for manufacture of bleaching powder. Corrosion of apparatus is least when this is made of Durichlor alloy (Fe—Si—Mo), but Fe—Si is also resistant. Of non-metallic materials, fused basalt and diabase-picrite were the most suitable. R. T.

Methods of control of bromine production by the aëration method. S. K. AFANASIEV, M. A. PORTNOV, and J. N. TSCHEPEL'KIN (J. Appl. Chem. Russ., 1937, 10, 1421—1426).—The Sb electrode gives more satisfactory results for measurement of the p_{H} of flowing acidified sea- H_2O at p_{H} 3—4 than does the H_2 or W electrode. Stabilisation of the potential is achieved in 15—20 sec., and reproducible results are obtained during at least 6 days of use. R. T.

Analysis of crude phosphorus and sludges containing phosphorus. E. H. BROWN, H. H. MORGAN, and E. R. RUSHTON (Ind. Eng. Chem. [Anal.], 1937, 9, 524—526).—The sample is washed into a specially-prepared Gooch crucible, partly dried by suction, and weighed moist with suitable precautions. The crucible + weighed sample is covered with C_6H_6 and extracted with hot C_6H_6 in the special apparatus described. The C_6H_6 -insol. residue is then weighed. The H_2O in the moist sample is also collected and measured. Aliquot portions of the C_6H_6 extract are analysed gravimetrically or volumetrically for PO_4^{--} after pptn. of the P with aq. $\text{Cu}(\text{NO}_3)_2$ and oxidation of the phosphide formed by means of HNO_3 saturated with Br. The results show that a solution of P in C_6H_6 can be refluxed for at least 90 min. without loss. A technique for handling and weighing small samples of pure P is also described. L. S. T.

Photometric determination of added phosphorus in oils. P. GOODLOE (Ind. Eng. Chem. [Anal.], 1937, 9, 527—529).—The oil (1 g.) is ashed with an equal wt. of ZnO, which is preferred to other substances for the purpose. After extraction with dil. H_2SO_4 and dilution to 250 c.c., 25-c.c. portions are made faintly acid, using Na_2CO_3 for the neutralisation, and then treated with NH_4 molybdate reagent and SnCl_2 . The determination is completed photometrically, using the colorimeter described by Story *et al.* (B., 1933, 554). Interference by Fe is overcome by addition of $\text{Na}_2\text{S}_2\text{O}_5$. When the wt. of oil is such that the P content of the aliquot portion is 0.005—0.04 mg. the method is accurate to 0.001% P. By suitable dilution it can be applied to substances containing much more P. The time required for a complete analysis is <1 hr. L. S. T.

Desorption method [for liquid H_2 etc.].—See I. Determining S in pyrites. S from fuel gases.—See II. Acid-resistant linings.—See VIII. Acid-resistant cast Fe. Treating minerals.—See X. Prep. of $(\text{NH}_4)_2\text{S}_2\text{O}_8$. Electrolysis of $\text{Fe}_2(\text{SO}_4)_3$. Determining p_{H} of Ni solutions. Spectral analytical methods.—See XI. p_{H} of milk-of- MgO . Prep. of Bi subiodides.—See XX.

See also A., I, 611, Prep. of AgClO_4 . 625, Electrolytic prep. of D_2O . 627, Prep. of large

monocrystals of sylvine. 628, Prep. of compounds of bivalent rare earths. New phosphates. Prep. of AsH_3 in liquid NH_3 . 629, Prep. of F_2 .

PATENTS.

Preparation of phosphoric acid. W. C. WEBER, R. W. SHAFOR, and E. J. ROBERTS, Assrs. to DORR Co., Inc. (U.S.P. 2,049,032, 28.7.36. Appl., 2.7.32. Renewed 13.12.35).—Ground phosphate rock is mixed with dil. acid wash liquors from a succeeding stage of the process and with a regulated proportion of CaSO_4 crystals from a previous operation, and the mixture is treated with the appropriate amount of H_2SO_4 to liberate H_3PO_4 and ppt. the Ca as relatively coarse, readily filterable crystals of $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$.

A. R. P.

Purification of silicic acid. W. DÜSING and J. ENSZ, Assrs. to GEN. ELECTRIC Co. (U.S.P. 2,049,359, 28.7.36. Appl., 25.10.33. Ger., 11.11.32).— SiO_2 for the manufacture of ultra-violet light-transmitting glass is prepared by treating commercial water-glass solution with dil. H_2SO_4 containing H_2O_2 to ppt. the SiO_2 free from Fe^{+++} and Ti.

A. R. P.

Conversion of sodium sesquicarbonate into sodium carbonate decahydrate. G. L. CUNNINGHAM, Assr. to MATHIESON ALKALI WORKS, Inc. (U.S.P. 2,049,249, 28.7.36. Appl., 6.7.32).—The sesquicarbonate is treated with H_2O at 20° to leach out the Na_2CO_3 and leave a residue of NaHCO_3 . The solution is then cooled to 0° to crystallise $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$.

A. R. P.

Alkaline trisodium phosphate. H. ADLER, Assr. to VICTOR CHEM. WORKS (U.S.P. 2,050,249, 11.8.36. Appl., 9.4.34).—Aq. NaOH (d 1.27—1.5) at 30° is added to aq. Na_3PO_4 (d 1.3—1.35) at 60° and the mixture cooled to deposit long needles of $9(\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}) \cdot 2\text{NaOH}$.

A. R. P.

Composition of calcium carbide. J. B. A. G. NEUMANN (U.S.P. 2,048,962, 28.7.36. Appl., 25.6.34).— CaC_2 granules are sprayed with 4% of a heavy petroleum distillate to preserve them during storage and to ensure a steady flow of C_2H_2 during use.

A. R. P.

Conditioning of barium sulphide and making sodium and zinc sulphides therewith. T. A. MITCHELL and R. L. SESSIONS, Assrs. to HUGHES-MITCHELL PROCESSES, Inc. (U.S.P. 2,050,802, 11.8.36. Appl., 23.8.33).—Aq. BaS from extraction of the reaction product of BaSO_4 and coke with H_2O is treated with aq. NaCN at $<20^\circ$ to destroy polysulphides and the purified solution is used for pptn. of ZnS or for making Na_2S by interaction with Na_2SO_4 or Na_2CO_3 .

A. R. P.

Preparation and use of catalysts. H. R. ARNOLD and W. A. LAZIER, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,047,945, 21.7.36. Appl., 18.8.32).—A neutral solution of CdSO_4 and NiSO_4 or CoSO_4 is treated with the theoretical amount of $(\text{NH}_4)_2\text{CrO}_4$ and the washed ppt. converted into small pellets, which are heated in H_2 at 325° , to produce a hydrogenation-dehydrogenation catalyst.

A. R. P.

Production of cuprous cyanide. C. DANGELMAJER, Assr. to E. I. DU PONT DE NEMOURS & Co., Inc. (U.S.P. 2,049,358, 28.7.36. Appl., 26.8.33).—A saturated solution of crude Cu_2Cl_2 in 26% aq. NaCl containing 0.05—1% of HCl is treated with a deficiency of NaCN such that the mother-liquor from the CuCN ppt. contains 0.5—5 g. of Cu per litre; all the impurities remain in solution.

A. R. P.

Zinc sulphide. E. J. FLYNN, Assr. to NEW JERSEY ZINC Co. (U.S.P. 2,049,646, 4.8.36. Appl., 24.1.35).—Neutral aq. ZnSO_4 is treated with H_2S produced by interaction of BaS with the acid mother-liquor from a previous pptn. of ZnS . The BaSO_4 obtained in the H_2S generator is reduced to BaS by heating with coal, thus making the process cyclic.

A. R. P.

Manufacture of aluminium chloride. G. M. ATHERHOLT, Assr. to GULF OIL CORP. (U.S.P., 2,048,987, 28.7.36. Appl., 5.1.34).—In the process involving treatment of a red-hot mixture of C and Al_2O_3 with Cl_2 , the pressure in the system is maintained at 1—2 atm. to obtain the AlCl_3 as a liquid in the condenser.

A. R. P.

Desiccation of gases contained in nitrous fumes. G. LEFORT DES YLOUSES, Assr. to L'AZOTE FRANÇAIS (U.S.P. 2,060,183, 10.11.36. Appl., 6.8.31. Fr., 28.11.30).—For the drying of N oxides (from NH_3) prior to absorption in CaO they are chilled to slightly above 0° (10°) to condense the bulk of the dil. HNO_3 and are next cooled to below 0° but above the f.p. of dil. HNO_3 for final removal of H_2O . Heat is recovered by exchange in stages and delivered to the dry gas.

B. M. V.

Separating the constituents of air. L. S. TWOMEY (U.S.P. 2,057,804, 20.10.36. Appl., 9.5.34).—The fractionators include the following stages: (1) separation of pure N_2 at comparatively high pressure, (2) refractionation of several condensates from (1), a middle O_2 fraction (M) rich in A being transferred to stage (3), which is caused to lose heat to (2), producing eventually gaseous pure A and a condensate containing less A than M , which is returned to (2).

B. M. V.

Recovery of sulphur from its combinations with hydrogen or oxygen. W. J. MURRAY, Assr. to A. D. LITTLE, Inc. (U.S.P. 2,052,892, 1.9.36. Appl., 27.6.32).—Gases containing H_2S are scrubbed with aq. $\text{Ca}(\text{HSO}_3)_2$ [$\text{Ca}(\text{HSO}_3)_2 + 2\text{H}_2\text{S} = 3\text{H}_2\text{O} + \text{CaS}_2\text{O}_3 + 2\text{S}$] and the aq. CaS_2O_3 so formed is heated to bring about the reaction $\text{CaS}_2\text{O}_3 = \text{CaSO}_3 + \text{S}$. The CaSO_3 is then reconverted into $\text{Ca}(\text{HSO}_3)_2$ by treatment with SO_2 produced by burning the H_2S in another portion of the gas. The S formed is recovered. Apparatus is described.

A. B. M.

Production of sulphur dioxide [from oil-refinery acid sludge]. H. O. C. INGRAHAM, Assr. to GEN. CHEM. Co. (U.S.P. 2,057,099, 13.10.36. Appl., 10.3.33).—Petroleum acid sludge is partly burned in a rotating cylindrical burner having agitating devices comprising loose ribbed rollers, and the coke produced is burned externally to heat the cylinder.

B. M. V.

Apparatus for phosphorus recovery. S. D. GOOCH (U.S.P. 2,062,091, 24.11.36. Appl., 23.3.35).—

Blast-furnace gases are caused to move upwards in a spray chamber provided with a conical bottom through the apex of which the sludge containing P is removed.

B. M. V.

Recovery of phosphorus. F. P. KERSCHBAUM and S. D. GOOCH, Assrs. (B) to PEMBROKE CHEM. CO. (U.S.P. 2,050,796—7, 11.8.36. Appl., [A] 14.7.33, [B] 13.6.35. Ger., [A, B] 25.10.32).—(A) In the electro-thermal recovery of P from phosphate rock the gases from the furnace are sprayed in towers with 0.1—1N-H₂SiF₆ to condense the P. (B) Apparatus for use in this process, consisting of an arrangement of dust catchers and precipitators, spraying towers, and means for circulating the spray liquors and for excluding air from the system, is claimed. A. R. P.

[Al₂O₃ extraction by] continuous digestion.—See I. S from gases. H₂SO₄ from sludge acid.—See II. Treating Cu-Sn-Pb compositions. Se from Cu-refinery mud.—See X. Fertiliser.—See XVI.

VIII.—GLASS; CERAMICS.

Various Bricesco tunnel kilns. T. W. SHOOK (Trans. Ceram. Soc., 1937, 36, 414—432).—The kilns described include a direct-fired kiln for burning heavy clayware, three general types (direct-fired, semi-muffle, and muffle) for burning whiteware and glazed goods, and a direct-fired type operated on clean fuel such as town gas for burning glazed goods placed in the open. With properly designed tunnel kilns the manufacturing time, kiln labour, and fuel costs are < for periodic kilns; production is continuous and the quality of the product uniform. A. L. R.

Industrial propane as a glass-plant fuel. ANON. (Glass Ind., 1937, 11, 377—380).—The application and advantages derived from the use of C₃H₈ as fuel are described. Applications such as in the heating of forehearths, lehrs, conveyors, etc. are outlined. Various types of burners are described; no extensive alterations are necessary in a normal heating system when a change-over to C₃H₈ fuel is made. C. L. M.

Homogenisation of glass in smelting tanks. E. BAYER (Glashütte, 1937, 67, 691—692).—The circulation of glass is affected by its conditions and composition as well as by the form and arrangement of the tank and any mechanical circulating devices, and all these factors must be considered when designing plant or formulating glasses. G. H. C.

Applications of nickel alloys in the glass industry. ANON. (Glass Ind., 1937, 18, 340—342).—The various types of Ni alloys available are defined, e.g., Ni cast Fe, Ni-Cr alloys, heat-resisting steels, etc. The use of these alloys in certain types of equipment is discussed, e.g., in melting and working equipment and in lehr construction. C. L. M.

Glass sands. W. R. SCHOLES (Glass Ind., 1937, 18, 293—297).—The occurrence and initial treatment of sand for glass-making are described. The various specifications are discussed in relation to the type of glass to be produced. C. L. M.

Influence of cullet and moisture on the melting and working of glass. K. KÜGLER (Glashütte,

1937, 67, 467—470).—Published work on this subject is discussed and summarised. The apparently contradictory results of Turner *et al.* and of Gehlhoff and Thomas on the influence of cullet on the η of glasses could be explained by the difference in conditions under which the tests were conducted.

C. L. M.

Behaviour of sodium nitrate and arsenious oxide during heating with glass mixtures. M. A. BESBORODOV, N. D. ZAVJALOV, T. A. LADE, and G. M. MINKIN (J. Appl. Chem. Russ., 1937, 10, 1407—1420).—The wt. losses sustained by mixtures of SiO₂ and CaCO₃ with NaNO₃ and/or As₂O₃, in presence or absence of Na₂CO₃, and by the mixtures As₂O₃-Na₂CO₃ or -NaNO₃, have been measured at 200—900°. R. T.

Zinc oxide in the glass industry. ZSCHACKE (Glashütte, 1937, 67, 479—481).—The production of ZnO and its uses in the manufacture of optical, chemical, heat-resisting, and coloured glasses are discussed. C. L. M.

Processes in the annealing of glasses and synthetic resins. E. JENCKEL (Z. Elektrochem., 1937, 43, 796—806).—The changes with time of the η and d of Se and colophony glasses have been measured at various temp. and after various temp. changes. The variation of d for cryst. salicin with the pressure under which crystallisation occurs has also been followed. Strains in synthetic resins cause abnormal changes in dimensions on heating. It is suggested that the prep. of synthetic resins in this state should be advantageous for special purposes, the phenomena observed being compared with those encountered with certain metals. J. W. S.

"Securit" plate glass. ANON. (Glass Ind., 1937, 18, 273—275).—Ordinary plate glass is rapidly chilled from a temp. very near its softening point. The special procedure is described and the phenomenon of internal stress reviewed. Vals. relating to the resistance of the glass to deflexion, shock, crushing loads, torsion, vibration, and thermal shock are given. C. L. M.

Art of decorating glass. V. H. REMINGTON (Glass Ind., 1937, 18, 267—271).—The uses of rubber stamps, transfers, metallic resinates, and metallic colours for printing on glass are described. Lithographic methods for transfer production are also mentioned. The conditions of firing the colour are defined, and suitable tests for alkali-, acid-, and sulphide-resistance are reviewed. C. L. M.

Development of modern coloured glass. ANON. (Glass Ind., 1937, 18, 263—264).—The production of a pure yellow glass is described. Addition of CeO₂ and TiO₂ is found to produce the desired colour. The presence of other rare-earth elements must be avoided, otherwise muddy effects are obtained. The possible formation of Ce Ti silicates in the development of the colour is discussed. Changes in the intensity of the colour are noted. If the CeO₂ content is kept const. at 2.6% and the TiO₂ increased from 2.4 to 5.5% a uniform increase in colour density results. C. L. M.

Methods of testing the chemical resistivity of glass. W. TEPHOL (Glashütte, 1937, 67, 525—527).—A general discussion of methods available.

C. L. M.

All-glass apparatus for measuring density of glass by flotation. E. SEDDON (J. Sci. Instr., 1937, 14, 376—378).—A standardised form of apparatus is described, and suitable immersion liquids are listed.

J. S. A.

Opacifying media in enamels and powders. H. MELZER (Glashütte, 1937, 67, 530—532).—Possible substitutes for SnO_2 in white enamels are reviewed.

C. L. M.

Sodium silicofluoride as opacifier for enamel. R. ALDINGER (Glashütte, 1937, 67, 675—677).—Best results are obtained in fusible enamels rich in alkalis; excess of acidic oxides promotes loss of SiF_4 , for which allowance must be made.

G. H. C.

Avoidance of frothing in vitreous enamelling. ANON. (Keram. Rundsch., 1937, 45, 286—288).—The origin of frothing could not be traced to any particular stage in the process; it can be avoided only by minute attention to detail.

G. H. C.

Results of technical research on enamel [for iron]. A. DIETZEL (Naturwiss., 1937, 25, 440—443).—A review of work on the matching of the coeff. of expansion of enamel and Fe, and on the conditions under which enamel may be made to adhere firmly to Fe without causing corrosion.

A. J. M.

Black enamels for cast iron. ANON. (Glashütte, 1937, 67, 481—482).—Formulae for the production of black enamels are given and their appearance and durability to acid and H_2O discussed. In general terms, whilst Pb enamels endow the Fe with an excellent appearance, the Pb content must be reduced to produce durability.

C. L. M.

Removal of enamel [from metal]. H. KIRST (Glashütte, 1937, 67, 592—594).—Methods, such as sandblasting at 5 atm., and the use of acid solution, for the removal of enamel from spoiled ware are described.

C. L. M.

Repair of damaged enamel coatings. ALDINGER (Glashütte, 1937, 67, 710—711).—The damaged part may be recoated and the whole object fired again, or enamel may be sprayed on through a flame as in metal-spraying. For objects not exposed to drastic conditions stove enamels, Na silicate, or Mg oxychloride cements may give serviceable repairs.

G. H. C.

Experimental dryer for claywares. H. H. MACEY and S. R. HIND (Bull. Brit. Refract. Res. Assoc., 1932, No. 28, Reprint; Trans. Ceram. Soc., 1937, 36, 433—441).—Details are given of the dryer, which permits the testing of full-sized clay blocks (up to $1\frac{1}{2}$ —2 cwt. in wt.) under a wide range of accurately controlled conditions of temp., humidity, and air flow.

A. L. R.

Improvement of domestic [North Carolina] china clay by deflocculation and controlled separation. F. E. SMITH (Chem. Met. Eng., 1937, 44, 594—596).—An illustrated description with flow sheet of the plant at Lunday, U.S.A.

D. K. M.

Secondary expansion in refractory clays. J. O. EVERHART (J. Amer. Ceram. Soc., 1937, 20, 353—359).—Several flint and plastic clays showing an increase in vol. over the firing range cone 6—14 were examined chemically, petrographically, and with X-rays. Microscopical examination of sections of fired specimens showed that the expansion was caused by the opening up of the planes of natural lamination of the clay particles and not by impurities in them. The expansion was reduced by finer grinding of the clay and use of higher moulding pressures (up to 6000 lb./sq. in.). It is suggested that clay blending and firing in an oxidising atm. would also be advantageous.

J. A. S.

Effect of temperature on structure of soapstone. H. WILSON and J. A. PASK (J. Amer. Ceram. Soc., 1937, 20, 360—363).—Massive samples of a Washington mineral were examined petrographically after rapid cooling from a range of firing temp. in an oil muffle. The decomp. of the pyritic impurities at 700° was followed by the formation of enstatite (MgO, SiO_2) at 1000° and of clino-enstatite at $>1200^\circ$. The Fe impurities spread through the laminations as fayalite (FeO, SiO_2).

J. A. S.

Magnesium silicates: steatite. VII. S. NAGAI and G. INOUE (J. Japan. Ceram. Assoc., 1935, 43, 412—424; cf. B., 1936, 497).—Addition of 3—15% of Al_2O_3 [as $\text{Al}(\text{OH})_3$] to talc decreased the burning temp. and shrinkage and increased the bending and compressive strengths. Addition of 10—20% of Zettlitz kaolin gave greatly increased strength and very low porosity. The firing temp. was 1350 — 1400° . 5—10% of ZnO gave less improvement than did kaolin. The talc- Al_2O_3 mixtures gave the max. resistance to spalling when quenched in H_2O . Talc- Al_2O_3 and talc-kaolin samples were stable to superheated steam ($180^\circ/10$ atm.). Talc-ZnO was less stable. All were more stable than was talc alone. The electrical resistance was especially high in the talc- Al_2O_3 series.

CH. ABS. (e)

Ceramic materials for high-frequency insulation. H. THURNAUER (J. Amer. Ceram. Soc., 1937, 20, 368—372).—A review. The nature, properties, and manufacture of bodies having a low dielectric loss (steatite and $\text{MgO}-\text{TiO}_2$) and high ϵ (TiO_2) are briefly described.

J. A. S.

Rock wool. O. STUTZER (Glashütte, 1937, 67, 567—569).—The properties of rock wool are described and analytical data regarding composition given. The main constituents are SiO_2 , Al_2O_3 , CaO, and MgO.

C. L. M.

Specifications and test methods for the quality of ceramic roof tiles in Switzerland. M. ROŠ (Tonind.-Ztg., 1937, 61, 1002—1003).—*Capillary rise*: A tile held in the vertical plane with its lower edge immersed to a depth of 1 cm. in distilled H_2O at 18° (R.H. 90%) must not allow the H_2O to rise >25 cm. *Water-permeability*: An area of 10 sq. cm., under vac. (710 mm. Hg), must not pass >80 c.c. of $\text{H}_2\text{O}/\text{hr}$. *Bending strength*: The breaking load applied at the middle point of a 25-cm. span for flat tile and 30-cm. span for interlocking tile must be ≤ 120 and ≤ 190 kg., respectively. *Frost-resistance*: The tile subjected to 50 freezing and

thawing cycles (-20° to 15°) during a period of 4 weeks must retain its "ring" and not shatter or peel its engobe etc., and the decrease in bending strength must be $>15\%$. The bursting of "lime spots" >3 mm. in diameter must occur but seldom, and efflorescence of a tile partly immersed in H_2O must not be marked in 14 days. The tiles should have an apparent and true d of 1.62—1.95 and 2.5—2.7, respectively, and a porosity of 20—40%.

J. A. S.

Ceramic colours. R. HOHLBAUM (Glashütte, 1937, 67, 633—634, 660—662, 677—679, 692—694).—Formulae and instructions are given for preparing glaze and underglaze colours, transparent coloured glazes and opaque glaze pigments, and metallic-lustre glazes.

G. H. C.

Dust hazards and their control in a ceramic industry. T. C. ANGUS and D. STEWART (J. Inst. Heat. Vent. Eng., 1937, 11, 13—18).—The composition of the dust escaping during the manufacture of electrical earthenware, the effect of its inhalation on health, and methods of preventing the escape of dust are discussed.

R. B. C.

Suitability of quartz rock from the Pfahl for manufacture of silica bricks. R. KÖNIG and L. STUCKERT (Sprechsaal, 1937, 70, 541—543, 556—557, 565—568).—From measurements of the change of d on heating the powdered material, it is concluded that the reason why sound SiO_2 bricks cannot be made from SiO_2 rock is that it does not undergo spontaneous transformation at high temp., whereas the less pure forms do so. Addition of mineralisers, e.g., Na_2WO_4 , $LiCl$, NaF , Na_2SiF_6 , or $Na_2O \cdot 2SiO_2 \cdot 2H_2O$ makes this possible. In practice 2—5% of $NaCl$ is efficient; a greater proportion has no advantage. The transformation is hastened by firing at higher temp., and by securing intimate penetration of the $NaCl$ by grinding the SiO_2 finely and tipping it while hot into $NaCl$ solution. Bricks containing 2% of $NaCl$ and 2% of CaO (binder) compared favourably with ordinary commercial bricks. Using $CaCO_3$ in place of CaO , hand-made bricks proved stronger than those hydraulically pressed.

G. H. C.

Refractory silica brick. CARLOWITZ (Feuerungstechn., 1937, 25, 51—52).—Its manufacture is described.

R. B. C.

Utilisation of certain magnesium silicates as refractories. A. BASILEVITSCH (Min. Suir., 1935, 10, No. 2, 27—30).—Chalilovo talc and asbestos waste have a relatively low refractoriness but a high resistance to alkalis. Talc stone (talc 50; $MgCO_3$ 40; serpentine, chlorite, and magnesite 8—10%) has a medium refractoriness, with an incipient deformation temp. of 1520° . This can be improved by enriching with magnesite. The product consists mainly of forsterite and periclase.

CH. ABS. (e)

Refractory hydraulic cements. I. Preparation of high-alumina calcium aluminates. II. Alteration of strength on heating. III. Refractory properties of cements and their manufacture from naturally occurring raw materials. S. KONDO, T. YAMAUCHI, and Y. INAMURA (J.

Japan. Ceram. Assoc., 1937, 45, 227—236, 313—319, 373—383; Zement, 1937, 26, 705).—I. A mixture containing $3CaO + 5Al_2O_3$ yielded $CaO \cdot Al_2O_3$ (I) and a little $5CaO \cdot Al_2O_3$ at 1300° and $3CaO \cdot Al_2O_3$ with little (I) at 1500° , whilst $CaO + 3Al_2O_3$ gave $3CaO \cdot 5Al_2O_3$ and a little (I) at both temp. The surplus Al_2O_3 was found as the α -modification in all cases; $<1\%$ of free CaO remained after heating at 1300° , and none at 1500° ; the amount of higher aluminates formed is roughly \propto temp. and the proportion of Al_2O_3 in the mix. Equilibrium was attained after heating for 4 hr.

II. Hydrated mortars (1 : 3) from burnt $3CaO + 5Al_2O_3$ and $CaO + 3Al_2O_3$ mixtures lost much H_2O between 200° and 300° , but little above that temp. After a marked fall at 400° , strength was retained to 1000° .

III. Addition of 4% of Fe_2O_3 , MnO_2 , or particularly Fe_2O_3 and SiO_2 together improved the refractoriness of the products. Much shrinkage of the mortar occurred at 300° . Practicable raw materials were diaspore and limestone; when much SiO_2 is present, more CaO is required to preserve the setting properties.

G. H. C.

Acid Bessemer refractories. J. H. CHESTERS and R. J. McLEAN (J. Amer. Ceram. Soc., 1937, 20, 373—378).—The failure of the tuyères is due largely to the attack by FeO and MnO which, if present to the extent of only 8%, lower the m.p. of the refractory to the temp. of the molten metal (1550°). The chemical and physical properties of a typical English and American 38% Al_2O_3 fireclay ramming mass are recorded. A range of refractories was tested for tuyère use by crucible-slugging tests, refractoriness tests on mixtures of the refractory and slag, and by service tests with experimental tuyères. Improved slag-resistance is likely to be obtained from (1) basic refractories (magnesite or chrome-magnesite), (2) plumbago, or (3) fireclay (preferably $>38\%$ of Al_2O_3) materials with improved spalling-resistance.

J. A. S.

Manufacture of acid-resisting lining materials. ANON. (Tonind.-Ztg., 1937, 61, 1003).—Curved and flat tiles were extruded from a pug mill. Diagrams of the mouthpieces are given.

J. A. S.

Effect of alkalis on refractories. F. HARTMANN (Stahl u. Eisen, 1937, 57, 1017—1021).—Even at low temp. alkali vapours attack fine-grained SiO_2 refractories, but large grains of quartz are more resistant. At 1000° softening of fireclay is effected by alkali vapours, and in contact with molten alkali a glass of low m.p. is formed on the surface in which blowholes quickly form. Although magnesite is fairly resistant chrome-magnesite is strongly attacked, due to the alkali reacting with the Cr oxides. Molten Na_2CO_3 quickly attacked a ladle lining made with fatty clay, but one with high Al_2O_3 content was fairly resistant. High Mn and Fe contents of slags counteracted the effect of alkali; such slags were even made more viscous and hence less reactive. Highly basic blast-furnace slags were not made appreciably more fluid by additions of Na_2CO_3 .

W. P. R.

Monofrax refractories. A. P. THOMPSON (Glass Ind., 1937, 11, 363—366).—The development, and testing, both on a small and a large scale, of certain refractories are described. The types mentioned consist of those with (a) a high α - Al_2O_3 content, (b) a high β - Al_2O_3 content, and (c) in which the composition of the mixes varies widely, but, in general, contain $< 80\%$ of Al_2O_3 . C. L. M.

Comparison of the thermal conductivity and thermal expansion of coke-oven liners made from eastern and western quartzite. J. B. AUSTIN, R. H. H. PIERCE, jun., and W. O. LUNDBERG (J. Amer. Ceram. Soc., 1937, 20, 363—367).—Brick made from Baraboo (Wisconsin) quartzite has a higher k (17% at 500°; 13% at 1000°) and a slightly higher expansion than brick of Tuscarora (Penna.) quartzite. The difference in k is accounted for by the porosities. J. A. S.

Apparatus for measuring thermal conductivity of refractories at high temperatures. J. L. FINCK (J. Amer. Ceram. Soc., 1937, 20, 378—382).—Difficulties experienced with the apparatus described previously (B., 1935, 356) are overcome by using loose, bead-insulated nichrome coils and SiC plates up to 900°, and Pt coils in grooved corundum plates for higher temp. J. A. S.

Deformation and Young's modulus of fire-clay brick in flexure at 1220°. R. A. HEINDL and W. L. PENDERGAST (J. Res. Nat. Bur. Stand., 1937, 19, 353—366).—Plastic and elastic deformations of 17 brands of brick, primarily intended for high-heat duty, were measured after reheating at 1400° and 1500°. Total deformation increases with % of coarse aggregate in bricks heated at 1400°, but the effect greatly diminishes after reheating at 1500°. It also increases with increase in the ratio of total flux to total SiO_2 , and is greatest for the dry-press and least for the stiff-mud type. In general, deformation decreases greatly after preliminary reheat treatment. Young's modulus is about twice as great after reheating at 1400°. F. L. U.

Light-scattering materials [enamels].—See I. Utilising Cu rocks etc.—See VII. Determining Cr in chromite. Dolomite bricks for furnaces.—See X.

See also A., I, 634, Glass-sealing furnace.

PATENTS.

Means for skimming the glass in a forehearth of a glass-melting furnace. T. F. PEARSON (B.P. 471,990—2, 2.5.36).—A submerged bridge is placed behind the gathering point, and a skimmer draws the surface of the glass backward over the bridge, thus producing a corresponding forward and upward flow of hot glass under the bridge. The form and motion of the skimmers differ in the three patents. B. M. V.

Apparatus for tempering glass. LIBBEY-OWENS-FORD GLASS Co., Assees. of J. L. DRAKE (B.P. 472,516, 28.12.36. U.S., 26.12.35).—During the chilling the glass is supported on horizontal rollers each comprising a no. of spaced, narrow discs in staggered relation on successive rolls. The motion

F (B.)

of the glass is continuous, and during most of its travel the blast means keeps an equal pace.

B. M. V.

Means for tempering glass. GILT EDGE SAFETY GLASS, LTD., H. PERRY, and A. W. GROTEFELD (B.P. 473,065—6, [A] 5.3.36, [B] 6.3.36. [A] Addn. to B.P. 449,602; B., 1936, 933. [B] Addn. to B.P. 449,864; B., 1936, 933).—(A) Adjusting means are described for the amount of liquid in the sprays and the area over which they operate. (B) The cooling liquid must have a temp. of combustion (? ignition) $>$ the softening point of the glass and may be a light lubricating paraffin, b.p. $< 200^\circ$, or an org. ester. B. M. V.

Apparatus for tempering glass sheets. SOC. ANON. DES MANUF. DES GLACES ET PROD. CHIM. DE ST.-GOBAIN, CHAUNY & CIREY (B.P. 473,604, 15.4.36. Fr., 30.4.35).—For supporting the sheet vertically \succ two tongs are directly connected to the supporting girder, other tongs being supported by swingle trees and weighted levers; in addition, tongs are placed at the vertical edges, these tongs having a considerable horizontal component of pull.

B. M. V.

Tempering of sheets or articles of glass. SOC. ANON. DES MANUF. DES GLACES ET PROD. CHIM. DE ST.-GOBAIN, CHAUNY & CIREY (B.P. 472,907—8, 1.4.36. Fr., [A] 10.4.35, [B] 6.4.35).—(A) Chilling is effected by fine-wire brushes which are kept cool either by fluid in their stocks or by jets of liquid, or by bringing the wires in contact with a cool surface. (B) A stream of cooling liquid on each side of the glass is uniform as regards one dimension (height) and reciprocated uniformly along the other (length).

B. M. V.

Combination annealing and decorating lehr. W. A. MORTON, Assr. to AMCO, INC. (U.S.P. 2,058,171, 20.10.36. Appl., 14.2.34).—A tunnel with conveyor is heated at one part by muffled combustion chambers above and below, the hot gases proceeding along a flue under the tunnel. Cold air is admitted to the goods at near the crit. temp. zone; its entry and the exit of the consequent hot air are regulated by dampers.

B. M. V.

Apparatus for use in case-hardening of glass sheets. D. H. GOODWILLIE, Assr. to LIBBEY-OWENS-FORD GLASS Co. (U.S.P. 2,057,569, 13.10.36. Appl., 16.7.34).—A truck with standards etc. for suspending glass sheets in the vertical position is described. B. M. V.

Glass-to-metal seal. H. SCOTT, Assr. to WESTINGHOUSE ELECTRIC & MANUF. Co. (U.S.P. 2,057,452, 13.10.36. Appl., 31.1.34).—An alloy of $< 40\%$ Fe with Ni and Co having an inflexion temp. $<$ the strain point of the glass is formed with a sharp edge, and the glass is caused to adhere to both sides of the metal edge, the glass edges being bulbous. B. M. V.

Setting up vitreous enamel slips. C. J. KINZIE, Assr. to TITANIUM ALLOY MANUF. Co. (U.S.P. 2,057,958, 20.10.36. Appl., 6.7.31).—The usual fruit acid-resisting slip, containing Ti, is difficult to keep in suspension for spraying or dipping. To overcome this difficulty flocculent, gelatinous $\text{Ti}(\text{OH})_2$, $\succ 4\%$ of clay, and an adhesive are added to a pulp of the ground frit. B. M. V.

Removal of enamel from enamelled articles. I. G. FARBERIND, A.-G. (B.P. 473,556, 14.4.36. Ger., 13.4.35).—The articles are pickled at 20–30° in HF 20, H₂SO₄ 20, and H₂O 60%. An inhibitor may be added if desired. B. M. V.

Furnaces of brick and tile kilns or ovens. R. GREEN (B.P. 473,466, 9.3.37).—A furnace in which the firebars are inclined at an angle of >45° is described. B. M. V.

Burning of clay, clay shales, and like argillaceous materials. METALLGES, A.-G. (B.P. 472,215, 6.1.37. Ger., 13.10.36).—Burning is effected in a rotary kiln heated in stages by fuel and air, or by the latter alone, injected through the rotating shell; the solid carbonaceous matter usually present also provides heat, but the sintering temp. is not permitted to be attained until the C has burned out. B. M. V.

Manufacture of ceramic catalyst. B. S. RADCLIFFE (U.S.P. 2,061,848, 24.11.36. Appl., 12.6.35).—A paste of SiC with about 20 wt.-% of plastic clay is moulded and fired. MgCO₃ (from a solution of a Mg salt) is then pptd. in and on the porous mass produced and, after drying, the latter is impregnated with Pt and roasted. B. M. V.

Manufacture of mineral wool. E. R. POWELL, Assr. to JOHNS-MANVILLE CORP. (U.S.P. 2,057,393, 13.10.36. Appl., 27.7.28. Renewed 31.1.35).—The material is preheated while falling zigzag down a stack, and when near its m.p. drops across a horizontally travelling flame of pulverised fuel and air. From the pool of molten slag separate streams are drawn off from parts at slightly different temp., and therefore at different η , and are subjected to separate steam blasts to form wools of different texture. B. M. V.

Refractory linings for shaft furnaces. H. A. BRASSERT & Co., LTD., and H. A. BRASSERT (B.P. 471,973, 14.2.36 and 15.2.37).—Hollow cooling ribs embedded in the wall of a shaft furnace are described. B. M. V.

High-temperature refractory. J. D. MORGAN and R. E. LOWE, Assrs. to DOHERTY RES. CO. (U.S.P. 2,061,099, 17.11.36. Appl., 24.9.34).—The refractory comprises 50% of Si, 29% of zircon, and 20% of electrically fused Al₂O₃, Cr₂O₃, SiC, and/or ZrO₂, bonded by H₃PO₄ (6% added in two stages), which reacts with some constituents. B. M. V.

Manufacture of cast [porous] refractory. R. C. BENNER, Assr. to CARBORUNDUM CO. (U.S.P. 2,060,017, 10.11.36. Appl., 27.4.34).—A crystallisable fusion of refractory oxides and a gas-producing substance is partly chilled to form an impervious shell which entraps gas. Cooling is then continued more slowly to allow the centre to crystallise, elongated crystals and voids forming substantially normal to the surface. The composition is not claimed, but it is stated that natural corundum contains both the refractory oxides and the gas-forming constituents without addition. B. M. V.

Manufacture of silica brick. R. P. HEUER, Assr. to GEN. REFRACTORIES CO. (U.S.P. 2,062,005, 24.11.36. Appl., 11.8.34).—Salvaged SiO₂ brick is

ground and graded into three sizes and the largest (+30-mesh) and the finest (–50-mesh) grades are mixed with small proportions of the middle grade and a binder (Na silicate = 0.1–1.5% of Na₂O). The moist material is pressed at 1000 lb./sq. in. and the unfired bricks are usable as chequerwork. B. M. V.

Production of refractory [spinel] bodies [bricks]. T. R. HAGLUND (U.S.P. 2,048,861, 28.7.36. Appl., 16.4.34. Ger., 12.4.33).—Mixtures of Al₂O₃, Cr₂O₃, MgO, CaO, and SiO₂ in such proportions as to form Mg(Al,Cr)₂O₄ (I) and Ca₂SiO₄ (II) are fused together and the melt is allowed to cool slowly so that the (I) crystallises in small uniform crystals. On exposure to the air the (II) disintegrates and the (I) crystals can be separated by wet-concn. processes. A. R. P.

Manufacture of abrasive articles such as sandpaper. W. J. TENNANT, From CARBORUNDUM CO. (B.P. 473,619, 16.4.36).—The backing, preferably non-absorbent, is precoated with a resin solvent or liquid heat-hardenable resin, then powdered resin and, simultaneously or later, the abrasive grains are sprinkled on. The solvent is preferably furfuraldehyde, the resin is of the oil-modified phenolic type; a flexibiliser [(C₆H₄Me)₃PO₄] and an inert material (powdered flint) may be present. B. M. V.

Manufacture of [resin-bonded] abrasive articles. R. C. BENNER, O. L. MAHLMAN, and W. D. ROSSOW, Assrs. to CARBORUNDUM CO. (U.S.P. 2,061,931, 24.11.36. Appl., 6.12.34. Can., 20.6.32).—The grains are moistened with a homogeneous aq. mixture of liquid resin, powdered resin (preferably phenolic) is then added to re-form a dry granular substance, and this pressed to shape and heated. B. M. V.

Coating of abrasive particles. H. M. DENT and A. J. NORTON, Assrs. to GEN. PLASTICS, INC. (U.S.P. 2,059,983, 3.11.36. Appl., 27.6.32).—Abrasive particles are coated with thermosetting resin of lower m.p. than the abrasive, by causing the powdered resin to ascend in a stream of gas countercurrent to a hail of abrasive particles heated to such a degree that they become coated with a film of molten resin. B. M. V.

Manufacture of rubber-bonded abrasive articles. R. J. NOBLE, Assr. to HEVEATEX CORP. (U.S.P. 2,057,733, 20.10.36. Appl., 5.10.35).—The grain is first wetted with a solution having a strong bonding affinity for grain and rubber and preferably of a heat-hardenable nature, is then mixed with unvulcanised, pulverulent rubber, and the mixture moulded under pressure and vulcanised. B. M. V.

Apparatus for feeding molten glass. T. F. PEARSON (B.P. 473,271, 7.2.36).

Recuperator. Producing vitreous surfaces.—See I. Pure silicic acid.—See VII. Cast Fe for enamelling. Metal-quartz seals.—See X. Opal glass for lamps.—See XI.

IX.—BUILDING MATERIALS.

Cooling of rotary [cement] clinker. II. W. GILBERT (Cement and Lime Manuf., 1937, 10

259—273; cf. B., 1937, 1054).—From heating-curve data, k for cement clinker is calc. as 5.0 B.Th.U./sq. ft./hr./°F./in. Analysis of cooling curves gave H_c (heat loss by convection) = $0.328 W_a^{0.5} / D^{0.35}$, where W_a is the wt. of air in lb. per hr. per sq. ft. of the reduced area between the clinker lumps on the cooling grid, and D is the diameter of the clinker lumps in in. T. W. P.

Bulk density and [cement] clinker evaluation. G. MUSSGNUM (Zement, 1937, 26, 671—676).—Being insensitive to variations of chemical composition, the bulk d of clinker (cf. Anselm, B., 1936, 1095) is not a good index of clinker quality, though it serves as a good indication of the degree of burning. G. H. C.

Procedure for evaluating [cement] clinker. W. ANSELM and K. SCHINDLER (Zement, 1937, 26, 502—507, 515—518, 546—551).—The authors' previous conclusions (B., 1936, 1095) are amplified. The optimum bulk d of clinker (1.4—1.5) also corresponds with max. heat evolution on setting of the cement. The ϵ runs parallel with bulk d and may be used when the former cannot conveniently be determined. G. H. C.

Effects of heat-treatment of Portland cement clinker. W. LERCH and W. C. TAYLOR (Cement and Lime Manuf., 1937, 10, 249—254).—The strength of cements varied with the heat-treatment of the clinker, those having a certain amount of glass (*i.e.*, produced by quenching) being stronger than those fully cryst. Cements rich in MgO were unsound in the autoclave test when fully cryst., but less unsound when glassy. T. W. P.

Ferrari universal Portland cement. H. ALBERT (Tonind.-Ztg., 1937, 61, 1009—1012).—In a series of cements containing equiv. proportions of Fe_2O_3 and Al_2O_3 , optimum strengths were obtained with exactly the amount of CaO required to form $3CaO \cdot SiO_2$ and $4CaO \cdot Al_2O_3 \cdot Fe_2O_3$, and with SiO_2 moduli of 1.47—1.26. All these cements showed low shrinkage and high resistance to $MgCl_2$, $MgSO_4$, Na_2SO_4 , and NH_4Cl . G. H. C.

Relative value of gypsum and anhydrite as additions to Portland cement. P. S. ROLLER and M. HALWER (U.S. Bur. Mines, Tech. Paper, 1937, No. 578, 15 pp.).—The retarding action of anhydrite on the setting time of Portland cement is < that of gypsum, but mixtures of the two can be used safely with cements of normal fineness. The retardation depends on the amount of SO_3 added and on the quantity of H_2O previously adsorbed by the clinker. The mortar strength of cements was slightly reduced by the use of an anhydrite (25%)—gypsum mixture as compared with gypsum alone, except in one case, in which the cement was unusually low in alkalis. T. W. P.

Constitution of Portland cement. K. KOYANAGI, S. KATOH, and T. SUDOH (Zement, 1937, 26, 531—539).—Five representative clinkers [low-heat (I), Kühl (II), brownmillerite (III), high- Al_2O_3 (IV), and rapid-hardening (V)] were ground to pass 10,000 meshes/sq. cm. and separated into heavy and light fractions by centrifuging while suspended in mixtures of $C_2H_2Br_4$ and CH_2I_2 . Fe_2O_3 , Al_2O_3 , and MgO

contents increase, but CaO and SiO_2 contents decrease, with increasing d , corresponding with increase of $4CaO \cdot Al_2O_3 \cdot Fe_2O_3$ and decrease of $3CaO \cdot SiO_2$, respectively. $2CaO \cdot SiO_2$ increases with d in (II), (IV), and (V), and decreases in (I) and (III). The conclusions are confirmed by X-ray powder diagrams. G. H. C.

Silication of cement. A. DEBECQ (Verre et Silic. Industr., 1937, 8, 263—264).—The advantages derived from the process are discussed. The mechanism is described whereby the cement is rendered resistant to external influences by treatment with Na silicate. The methods available and the optimum conditions for the treatment of the cement are defined. C. L. M.

Testing cements with plastic mortars. G. HAEGERMANN (Cement and Lime Manuf., 1937, 10, 235—237).—Details are given of a method for testing the bending and compressive strength of mortar prisms, in which the sand used is made up of 1 pt. of fine sand and 2 pts. of ordinary standard sand, and in which H_2O is added in sufficient amount for a plastic mortar. The advantages of the method over that of present standard tests are discussed. T. W. P.

[Testing cements with plastic mortars.] A. GESSNER and A. FRANK (Cement and Lime Manuf., 1937, 10, 237—239).—A comparison is made of cement mortars tested by three different methods, on specimens made from earth-moist mortar according to the Czechoslovakian and German Standard Specifications, on prisms made from plastic mortar according to the Swiss Standard Specification, and on specimens similar to the first, but with plastic mortar similar to the second. The cements were grouped practically in the same order of strength by all three methods. T. W. P.

Theory of hydraulic cements. N. ILTCHENKO and H. LAFUMA (Chim. et Ind., 1937, 38, 438—440).—The Le Chatelier theory of the setting and hardening of cements is extended (a) to a setting action of an unstable to a stable anhyd. material, and (b) to hydrated material setting to material containing less H_2O . The setting of aragonite to calcite is described for (a) and the action $SiO_2 + BaO \cdot 9H_2O \rightarrow SiO_2 \cdot BaO \cdot 6H_2O + 3H_2O$ for (b). The loss in strength of aluminous cement at temp. $> 30^\circ$ is discussed in relation to (b). T. W. P.

Rapid determination of shrinkage of cement. O. SCHWACHHEIM (Zement, 1937, 26, 685—688).—Test-pieces are allowed to remain in their moulds for 2 days in a damp chamber. They are then removed from their moulds and their lengths are measured. After further periods of 1, 2, and 3 days individual pieces are removed from the chamber and subjected for 24 hr. to dry heat at 80° , slowly cooled over $CaCl_2$, and measured after a further 24 hr. The observed shrinkages correspond with those found after 28 days in normal storage. G. H. C.

Weathering-resistance of concrete. E. J. KILCAWLEY (Rensselaer Polyt. Inst. Bull., Eng. and Sci. Ser. Bull., 1937, No. 53, 84 pp.; Road Abs., 1937, 4, No. 412).—Data are given on the strength, permeability, and frost-resistance of two concrete

mixes and of the same mixes but with the cement partly replaced by colloidal clay. In both cases continuous freezing and thawing increased permeability, the increase being greater with the leaner mix. Permeability was reduced by keeping specimens continuously wet or continuously dry after curing.

T. W. P.

Determination of tensile strength from the bursting pressures of hollow concrete cylinders. A. POGÁNY (Zement, 1937, 26, 469—470; cf. B., 1937, 785).—A mathematical correction is made.

G. H. C.

Thermal expansion coefficients of concrete from various cements. A. GUTTMANN (Zement, 1937, 26, 614—616).—The differences between five standard cements were insignificant; the vals. decrease with age and approximate to that of steel at long ages.

G. H. C.

Silicate formation in lime mortars and sand-lime bricks. F. HUNDESHAGEN (Zement, 1937, 26, 628—631).—Sand purified by HCl and incapable of absorbing methylene-blue (I) was unaltered by exposure to $\text{Ca}(\text{OH})_2$ solution at temp. of $>50^\circ$ for >8 months. Staining of commercial sand-lime bricks with (I), Naphthol Green B, and phenolphthalein indicate that appreciable silicate formation occurs. The use of (I) may be useful as a works control procedure.

G. H. C.

Testing the weathering of building materials by means of the crystallisation test. A. SCHMOLZER (Mitt. Tech. Versuchsamt, 1936, 25, Jahresheft, 14—20; Road Abs., 1937, 4, No. 452).—The relation between natural weathering and artificial accelerated tests is discussed. Data for the study of weathering are obtained from determinations of frost-resistance, thermal and moisture expansion, resistance to acid attack and abrasion, and from the Na_2SO_4 crystallisation test. Tests on calcareous sandstone and limestone after cycles of storage (24 hr.) in 10% aq. Na_2SO_4 at 20° and drying at 100° (48 hr.) gave results in agreement with practical experience.

T. W. P.

Problems in connexion with modern roads and road construction. R. G. BATSON (Chem. and Ind., 1937, 1065—1069).—A discussion.

Testing the permeability of bituminous road surfacings. H. MALLISON (Strasse, 1937, 4, 474—475; Road Abs., 1937, 4, No. 454).—A steel tube, flanged at one end, and with the flange painted with hot bitumen, is pressed firmly on the cleaned road surface. The road surface adjacent is painted with hot bitumen and a closely fitting Fe ring is dropped over the tube. H_2O is poured in and the rate of fall of H_2O level and the appearance of H_2O on the road surface outside the bitumen coating are observed. Examples are given.

T. W. P.

New road-binding material. ANON. (Roads and Streets, 1937, 80, 40; Road Abs., 1937, 4, No. 395).—The use of lignin liquor, a by-product in the manufacture of rayon from wood pulp, for a binder for road surfaces is described.

T. W. P.

Durability and application of wood in chemical plant construction. F. KOLLMANN (Chem. Fabr.,

1937, 10, 447—451).—A lecture, in which the resistance of wood to attack by acid, alkaline, and salt solutions, and to org. substances, is reviewed.

I. C. R.

Queensland pine beetle and its control. A. R. BRIMBLECOMBE (Queensland Agric. J., 1936, 46, 582—585).—Timber is best protected by paint, by treatment with creosote (as an emulsion or dissolved in kerosene), or by $p\text{-C}_6\text{H}_4\text{Cl}_2$ dissolved in kerosene.

A. G. P.

Prevention of blue stain in hoop pine logs. H. E. YOUNG (J. Austral. Inst. Agric. Sci., 1937, 3, 160—162).—Staining of *Araucaria cunninghamii* by *Diplodia pinea* and other fungi is reduced by leaving the bark intact and sealing the ends of the logs. Barked logs should be sprayed with fungicide; Lignasan (HgEtCl), Bordeaux mixture, and creosote soap emulsion are effective in the decreasing order given, whilst quartzite (Na_2SiO_3) has no effect.

L. D. G.

Impregnation of timber in brown-coal mining. E. KRÜGER (Braunkohle, 1937, 36, 677—686).—Impregnating materials and methods are discussed and certain H_2O -sol. substances recommended.

A. R. PE.

Road tars.—See II. **Refractory cements.**—See VIII. **Bearing-metal substitutes.**—See X.

PATENTS.

Apparatus for drying or heating slurry or the like. J. S. FASTING (B.P. 472,600, 23.3.36).—Two cylindrical, gas-permeable walls are spaced apart to form an annulus in which balls, or other heat-transmitting bodies, are tumbled on rotation of the double drum. The slurry is sprayed into the interior and dry dust leaves through the outer wall, hot gases passing in the opposite direction.

B. M. V.

Manufacture of hydraulic cement. H. M. OLSON (U.S.P. 2,061,774, 24.11.36. Appl., 27.1.36).—Dry cementitious material is ground in presence of Cl_2 and oil, the latter being in liquid or vapour form.

B. M. V.

Cement mortar. H. F. KICHLINE, ASSR. to NORTH AMER. CEMENT CORP. (U.S.P. 2,057,382, 13.10.36. Appl., 8.4.35).—Ground hydraulic cement 73 and CaO 27% (approx.) together with 0.12—1.0% of a blending agent, e.g., Ca stearate, are mixed and reground, resulting in a product of high workability and high strength (specified in claims).

B. M. V.

Concrete or mortar mixers and the like. SCOTT, JOHNSON, & Co., LTD., and T. A. S. JOHNSON. From G. A. SEELEMANN & SOHNE (B.P. 473,564, 25.4.36).—The materials are delivered from a hopper, divided into compartments by adjustable partitions, into a proportioning worm of increasing pitch, then into a preliminary mixing worm at right-angles, and into a mixing drum, the process being continuous.

B. M. V.

(A) **Silicate surface coatings.** (B) **Surface compositions for building structures and the like.** N. PAL, and PALSALLES, LTD. (B.P. 473,153 and 473,158, [A] 27.4.36, [B] 16.6.36).—(A) An underlayer of sol. silicate is coated with chlorinated rubber, preferably applied as a solution in xylol and mixed with a small

proportion of tung oil. (B) CaSO_4 plaster with free $\text{Ca}(\text{OH})_2$, with or without casein, is treated, after setting, with alkali silicate and a vegetable oil, and then if desired as described in (A). B. M. V.

Road-making material. C. R. DE BERRY (B.P. 471,651, 16.11.36).—Blown bitumen is admixed with a volatile solvent, *e.g.*, kerosene, creosote oil, tar oil, which acts as a vehicle for bitumen, the resulting mixture containing 75–87.5% of blown bitumen and having a consistency such that it will just pour when cold. H. C. M.

Waterproofing of masonry structures. A. A. JOHNSON, Assr. to JOHNSON-MARCH CORP. (U.S.P. 2,061,098, 17.11.36. Appl., 24.5.33).—The masonry is coated in succession with: (1) a permanently elastic layer of mixed aq. emulsions of asphalt and rubber, with a vulcanising agent if desired, applied cold; (2) fabric; (3) another waterproof coat; (4) a wear-resisting layer of concrete. B. M. V.

Manufacture of compositions capable of producing hard or plastic masses [for covering walls etc.]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 474,746, 4.4.36).—A mixture of inorg. (stone flour) and org. (sawdust) H_2O -insol. fillers, containing pigments if desired, is mixed with an aq. emulsion of a liquid natural or artificial H_2O -resistant product which dries by autoxidation or polymerisation (stand oil) and/or a solution of a substance yielding a dry H_2O -insol. film on evaporation of the solvent [*e.g.*, alkyl resin from condensation of linseed oil fatty acids, glycerol, and $\text{o-C}_6\text{H}_4(\text{CO})_2\text{O}$ in linseed oil + lacquer benzene], the emulsifying agent being sol. in both oil and H_2O [reaction products from $(\text{CH}_2)_2\text{O}$ and OH-derivatives of long-chain aliphatic compounds (castor oil)]. Driers (Mn linoleate) and/or softeners [$(\text{C}_6\text{H}_4\text{Me})_3\text{PO}_4$] may be added, and the proportions of filler and emulsion are such that a moist but not sticky product results. The products are particularly useful for floor and wall coverings. R. G.

Manufacture of coloured roofing granules. H. R. GUNDLACH, Assr. to CENTRAL COMMERCIAL CO. (U.S.P. 2,057,677—9, 20.10.36. Appl., [A] 17.11.33, [B] 21.3.35, [C] 3.10.35).—(A) The granules are coated with a suspension of metallic compounds [$\text{Ca}(\text{OH})_2$ and ZnO] and an inert pigment in a suitable binder (casein) and then treated with a sol. silicate < equiv. to the metals, and finally coated with a sol. fluoride to combine with the remainder of the metals, forming, on drying without fusion, a lattice of insol. silicates and fluorides holding the pigment in place. (B) The coating comprises china clay, CaCO_3 or BaCO_3 , and H_3PO_4 as main reactants and cryolite and ZnO as minor constituents, in addition to the pigment. (C) The claims are rather simpler than in (B). B. M. V.

Prevention of blooming of roofing granules. S. G. WRIGHT (U.S.P. 2,062,080, 24.11.36. Appl., 23.1.35).—Granules which are coated with Na silicate and burned at low temp. (600–650°) are treated with HNO_3 in such small quantity that they dry immediately [3 (U.S.) gals. of 13.5% acid per ton]. B. M. V.

Floor covering. E. T. A. COUGHLIN, Assr. to BARBER ASPHALT CO. (U.S.P. 2,056,958, 13.10.36.

Appl., 9.3.35).—A flexible base is impregnated with bitumen and coated with a paint comprising > 50% of pigment, the major part of the remainder being insol. (CH_2O) casein and the minor part rubber. B. M. V.

Surface-dressing composition for tennis courts. P. MAYO (U.S.P. 2,058,335, 20.10.36. Appl., 6.8.34).—A mixture is made of rosin 50–80, drying oil 10–30, and petroleum oil (*d* 0.933–0.824) 10–20 (12.5–15.0)%. B. M. V.

Composition of wood and natural or synthetic rubber or like material. G. W. BELDAM (B.P. 472,118, 12.3.36, 27.1. and 12.3.37).—The wood particles are $\frac{1}{16}$ — $\frac{5}{16}$ in. long and comprise 10–80% of the whole. The mass is vulcanised under pressure to form blocks or sheets. B. M. V.

Manufacture of fills and inlays in wood. C. A. CROWLEY (U.S.P. 2,057,882, 20.10.36. Appl., 10.11.33).—A vinyl resin, an ester gum, and a volatile solvent for both are mixed with cellulosic material (100-mesh wood flour) in proportions to form a very viscous material. B. M. V.

(A) Coated base material. (B) Coated wood material. R. T. JOHNSTON, Assr. to BAKELITE CORP. (U.S.P. 2,060,083—4, 10.11.36. Appl., [A] 20.8.31, [B] 4.3.32).—(A) Wood, cement, vegetable or animal felt, coated with bitumen or not, is provided with a weather-resisting outer coating composed of synthetic resin of the phenol type suspended in oil, and large particles of mineral matter with smaller particles in the voids. (B) Wood is coated with oil and a phenolic resin miscible with it, having the property of air-drying and not melting in sun heat. Granular material may be incorporated. B. M. V.

[Moulding apparatus for] manufacture of light sheets or slabs for building construction. E. DYCKERHOFF (B.P. 474,593, 18.12.37. Ger., 17.11.36).

Drying quasi-light material. Light-scattering materials [cements].—See I. Bituminous materials. Bitumen emulsions. Road coverings.—See II. Paper board. Felted sheet product.—See V. Treating wood surfaces.—See XXI.

X.—METALS; METALLURGY, INCLUDING ELECTROMETALLURGY.

Reports on blast-furnace field tests. I. Blast-furnace smelting principally Lincolnshire ores at the Frodingham works of the Appleby-Frodingham Steel Co., Ltd. BLAST-FURNACE REACTIONS RES. COMMEE. OF THE IRON AND STEEL INDUSTRIAL RES. COUNC. (Iron and Steel Inst., Spec. Rept. 18, 1937, 98 pp.).—By improved methods determinations of temp. and simultaneous sampling of gas and solid at short intervals along a no. of selected horizontal planes in a blast furnace were carried out. It was shown that temp. and physico-chemical conditions were far from uniform in any one plane. The temp. across the furnace was higher at the centre and near the inwall, the min. temp. usually occurring nearer the inwall than the centre. Lines of

equal temp. and $[\text{CO}_2]$ were almost coincident, but their actual form appeared to depend on the size-distribution of the burden in the furnace. At any given point in one plane the CO/CO_2 ratio followed the temp. in accordance with the thermodynamical aspect of equilibrium in the principal reversible chemical reactions known to occur in the furnace. The results of the investigation stress the importance of proper sizing and distribution of the solid burden. In the Appendix a method for the analysis of mixtures containing Fe in presence of its oxides is given [by H. L. SAUNDERS]. The basis of the method depends on the reaction $2\text{FeCl}_3 + \text{Fe} \rightarrow 3\text{FeCl}_2$. W. P. R.

Magnetising roasting of iron ores by the Kaiser-Wilhelm-Institut für Eisenforschung process. W. LUYKEN (Stahl u. Eisen, 1937, 57, 805—812).—The process depends on the production of the ferromagnetic Fe oxide, and a semi-industrial plant employing a 5-in. rotary kiln has been used to study the effects of varying temp. and ore charge per hr. on the economics of the process. W. P. R.

Cooling with ore in basic Bessemer practice. E. SPETZLER (Stahl u. Eisen, 1937, 57, 865—870, 899—900).—The excess heat in a basic Bessemer converter may be absorbed by means of scrap, pig Fe, and CaO, but under certain conditions it is more economical to use an Fe-rich ore low in P. The ore is reduced and the Fe taken up in the melt. W. P. R.

Statistical research on metallurgical processes in the basic Bessemer plant during the converter run. T. LÜTGEN (Stahl u. Eisen, 1937, 57, 993—999, 1022—1025).—The results of a large no. of observations on the working of basic Bessemer plants are described and given in the form of numerous graphs showing the relationship between pig analyses, temp., wear of lining, and length of blow. The condition and analysis of the burden may have, according to conditions determined by the contour of the converter, either a favourable or unfavourable effect on the general working efficiency of the plant. W. P. R.

Physical chemistry of metal-slag reactions. F. KÖRBER (Z. Elektrochem., 1937, 43, 450—460).—Recent work on the equilibrium between Fe and slag and on the distribution of the accompanying elements between metal and slag is summarised. A. R. P.

Behaviour of a blast furnace caused by changing of its internal profile. J. STOECKER (Stahl u. Eisen, 1937, 57, 545—552, 581—584).—The effect on the working of a blast furnace of scaffolding of the charge during its descent was investigated by determining the actual internal profile by means of hooked rods entering from the outer wall, the compositions of the gases at various levels and at distances from the centre, the variations of the gas flow by variation of the profile, and the effect of various tuyères. In general, the results do not point to any particular profile being most suitable, but indicate that careful records of data are useful in directing the mode of working the furnace when the output is adversely affected by changes in the profile. W. P. R.

Use of pressed dolomite bricks in the open-hearth furnace. J. SITTARD (Stahl u. Eisen, 1937,

57, 1305—1306).—Bricks ($14 \times 6 \times 4$ in.) made by pressing burnt dolomite (1—2 mm. grain size) with 4% of tar at 2000 atm. gave good life (>25,000 tons of steel) in the front and back walls of the furnace. When taken out of the furnace after 6 months the bricks were well sintered together and highly refractory, but they crumbled to dust after 10 days in damp air. J. A. S.

Cast iron for high resistance to acids. W. E. SCHRECK (Giesserei, 1937, 24, 561—564).—For high resistance to acids cast Fe should have a relatively low content of graphite and this should be in a highly dispersed form such as is obtained by overheating and casting at a high temp. The Mn content should not exceed about 0.6% and the Si content should be 1—1.5%; addition of 0.3% of Mo is beneficial, but addition of 6% of Si or 1.5% of Ni is deleterious. Alloys with 14—18% Si, however, have a high resistance to hot 10% H_2SO_4 as well as to conc. oxyacids. A. R. P.

Bending strength of temper cast iron and cast steel. F. ROLL (Giesserei, 1937, 24, 557—560).—The bending strength of temper white cast Fe decreases with increase in the ratio of distance between supports to diameter of test-piece and is greater with rods of round than with rods of square cross-section; the vals. vary between 70 and 120 kg./mm.² and for a rod of 12 mm. diameter are \gg the tensile strength (50 kg./mm.²). For black temper castings the cross-section of the rod is immaterial, the bending strength of both round and square rods being 65—95 kg./mm.², i.e., 65—140% > the tensile strength. For cast steel the bending strength is 2—3 times the tensile strength, but the metal is more sensitive to surface imperfections than are the cast-Fe varieties. A. R. P.

Methods of reducing internal stresses in grey-iron castings. G. N. GRISCHTSCHENKO (Metallurg, 1935, 10, No. 5, 69—85).—Internal stresses can be reduced by 50—60% by annealing the castings at 300° for 10 hr., by introducing Ni cores into the mould where the cross-section is greatest, and by heating the mould to 500° before casting.

CH. ABS. (e)

Refining of iron to the malleable condition. W. MCCONNACHIE (Blast Furnace Steel Plant, 1936, 24, 141—144, 148).—A discussion. It is believed that if slaked CaO could be introduced with the Bessemer blast, greater yields would result. The combined H_2O would act selectively on impurities without affecting the Fe. H formed would act on the oxides produced and CaO would combine with SiO_2 , leaving FeO free to be reduced by Mn, Si, C, or the gases. CH. ABS. (e)

Filtration and titration arrangements for rapid determination of phosphorus in iron and steel. A. SEUTHE (Chem.-Ztg., 1937, 61, 920—921).—Filtration is carried out under reduced pressure, and by a suitable arrangement of a three-way tap and of side-arms on the funnel and pressure-flask, the filtrate is collected separately from the wash liquid for the recovery of Mo. The titration set-up simplifies the standardisation of the NaOH and H_2SO_4 and gives direct readings of % P. L. S. T.

Influence of arc voltage on the working of an electric steel furnace. F. K. BUCHHOLZ, A. ZIEGLER, and E. VOOS (Stahl u. Eisen, 1937, 57, 681—682).—A variation in the length of the cables from the transformer to the electrodes in an 8-ton Héroult three-phase arc furnace caused heavy wear on the roof, a poor power factor, and a heavy electrode consumption. W. P. R.

Influence of thermal insulation of the hearth on the current consumption in electric arc steel furnaces. H. WEITZER (Stahl u. Eisen, 1937, 57, 697—701).—By increasing the thermal insulation of the hearth of an electric arc furnace to reduce radiation and conduction losses it was found that current consumption could be decreased by 3% and the melting down period by 11%; the cost of lining repairs was also reduced. W. P. R.

Development of coarse crystals by annealing normalised thin sheet steel. F. EISENKOLB (Stahl u. Eisen, 1937, 57, 999—1001).—The occasional production of coarse-grained steel sheet on annealing was investigated by annealing at temp. between 685° and 710° steel sheet containing <0.1% C after cooling at different rates from the normalising temp. Fast cooling rates cause the retention of non-metallic inclusions in solid solution and hence allows grain growth to develop on retreating. It is also suggested that the presence of thermal stresses favours rapid grain growth at annealing temp. W. P. R.

Hot-rolling experiments on carbon and high-alloy steels under various rolling conditions. A. POMP and G. WEDDIGE (Mitt. Kaiser-Wilh.-Inst. Eisenforsch., 1937, 19, 65—86).—A high-C steel, a non-scaling ferritic Si-Cr-Al, an austenitic Cr-Ni, a non-scaling Ni-Cr, and a heat-resistant carbide-rich Cr-Ni-W steel were rolled at 685°, 875°, 1020°, and 1185° with reductions of 10, 20, 30, and 40%. Raising the C content of the Si-Cr-Al and the plain C steels increased the resistance to deformation only up to rolling temp. of 900°; above this temp. the resistance of the high- was < that of the low-C steels. The alloy steels showed very much increased resistance even at the highest rolling temp. The spread was independent of composition and temp. All the steels with the exception of the high-C steel developed the finest microstructure when rolled at 875°, and the high-alloy steels showed elongation of the structure at all rolling temp. W. P. R.

Varied character of the heat-treatment of steel as defined by temperature-time curves. J. SEIGLE (Rev. l'Ind. Min., 1937, 514—524).—The infinite gradation of possible heat-treatments and of resulting structure in steel is stressed. Some typical examples are dealt with and calculations of the rate of cooling at various temp. for a simplified case are given. S. J. K.

Case-hardening of steels by means of the acetylene flame. J. FASSBINDER (Rev. Mét., 1937, 34, 289—291).—Experiments using a plain C and four special case-hardening steels were carried out by heating bars for various periods up to 2 hr. at 850°, 900°, 950°, and 1000° in a carburising flame, using C₂H₂ both as a heating and carburising gas. The

depth of penetration of C was measured and the method shown to be specially suitable for determining the suitability of steels for case-hardening.

W. P. R.

Nitriding of high-carbon globular-cementite steel. T. TAZAWA (Seitetsu Kenk., 1935, No. 143, 297—310).—Specimens of steel (0.75—1.31% C) consisting of globular cementite and pearlite were nitrided in an NH₃ stream at 660° for 20—30 hr. Penetration of N into globular-cementite steel is relatively easy. In high-C globular-cementite steel the N is <1% in the outermost part of the specimen. Pearlitic cementite becomes globular during nitriding.

CH. ABS. (e)

[Automobile] body-panel steels. E. MARKS (Auto. Eng., 1937, 27, 277—279).—The method used by Baldwins, Ltd., for producing killed steel sheets is described. R. B. C.

Effect of hydrogen under pressure on unalloyed steel. F. K. NAUMANN (Stahl u. Eisen, 1937, 57, 889—898).—Examples of the effect of H₂ attack on C steels in high-pressure hydrogenation plant are described and the results of an investigation to determine the influence of pressure, temp., and time on the initiation and progress of decarburisation on unalloyed steels are given. The onset of the attack depends on temp. and pressure and on the length of time of exposure. Once attack has started, the rate of penetration of H₂ rapidly increases. At 400—500° decarburisation is not complete and occurs in a branch-like formation starting at the grain boundaries. Cold-working decreases the resistance of the steel to attack. C is removed, but not P, S, and O. In presence of traces of O₂ in the gas, attack by H₂ under pressure gives rise to the formation of CO, whereas in low-pressure H₂ attack CH₄ is formed. The strength and toughness of the steel are greatly decreased by H₂ attack. W. P. R.

Effect of hydrogen on steel. P. BARDENHEUER (Stahl u. Eisen, 1937, 57, 593—599).—A review of present knowledge on the effect of H₂ on steel, whether dissolved by the solid metal, *i.e.*, during pickling or heating in a H₂ atm., or by molten steel.

W. P. R.

Influence of speed of pickling on the pickling of carbon steel and rustless steel. G. WALLQUIST, R. LINDBERG, and F. W. VON WALTER (Jernkont. Ann., 1937, 121, 529—571).—The pickling of 0.15% C steel and 1.10% C steel in 5—50% H₂SO₄ and 5—37.5% HCl, and of 18 : 8 Cr-Ni austenitic steel in 1—20% HCl-5—10% HNO₃ mixtures has been studied, from 20° to 95°. Three types of scale can be distinguished: a thick inner layer of FeO, covered by successive thin outer layers of Fe₃O₄ and Fe₂O₃, formed by high-temp. working of C steels; a thin layer of Fe₃O₄ covered by a thin layer of Fe₂O₃, formed by low-temp. working of C steels; and a thin resistant layer of non-ferrous oxides, formed on alloy steels. The attack may take one of six courses: (1) with low-C steel in warm dil. H₂SO₄, and with high- and low-C steel in warm HCl there is rapid attack of the oxide layer, with considerable flaking, followed by a short transition period to a slow steady attack of the metal; (2) with high- and low-C steel

in cold dil. H_2SO_4 and HCl the rapid oxide attack changes only gradually to the slow metal attack owing to absence of flaking and consequent retention of the more adherent patches of oxide; (3) with high- and low-C steel in warm conc. H_2SO_4 or HCl, with high-C steel in cold conc. H_2SO_4 , and with rustless steel in cold or warm HNO_3 -HCl, the rates of attack of oxide and metal are the same, and the rate of attack is thus const.; (4) with high-C steel in warm or hot conc. H_2SO_4 the metal is attacked more rapidly than the oxide, the rate of attack thus rising to a max.; (5) when conditions intermediate between those producing courses (1) and (3) obtain, there is a rapid initial oxide attack which slows down as the oxide becomes exhausted, and then rises again to a max. as the metal is exposed. This postulates that the outer oxide layers are more porous than is the inner; (6) with rustless steel in HNO_3 -HCl the attack sometimes dies off once or more often and suddenly returns to its former val. This is ascribed to temporary passivation, which has not previously been observed with HNO_3 -HCl solutions. In general, temp. has a greater effect than concn. on the attack of C steel. The rate of attack, especially of the oxide layer, is greater with HCl than with H_2SO_4 , and the former thus gives more rapid and more sharply cut pickling. Although there is no difference in the rate of attack of their respective oxide layers, high-C steel may be attacked as much as 20 times as fast as low-C steel under the same conditions. Attack of rustless steel in HNO_3 -HCl is dependent almost entirely on temp. and $[HNO_3]$.

M. H. M. A.

Development of special steels in relation to the available raw materials. E. HOUDREMONT (Stahl u. Eisen, 1937, 57, 480-493).—Economy in the use of alloying elements (Ni, Cr, W, etc.) can be considered only by a comparison of all the physical properties of alloyed and straight C steels, and a wide mass of data is given in the form of tables and graphs. For high-duty constructional steels the use of alloy steels is justified. The necessity for Ni is small except where the cross-section of the parts is large. A wider use of surface-hardening is recommended, and economy of W in high-speed steel is possible. The stainless and heat-resisting steels offer certain difficulties, but certain low-alloy magnet steels made from domestic alloy sources have given promising results.

W. P. R.

Stainless steels. Their application in the textile and rayon industries. C. W. HINKLE (Rayon Text. Month., 1937, 18, 450-452).—Cr-Ni (e.g., 18:8) stainless steels are resistant to acid-oxidation, but less resistant to acid-reduction. Addition of Mo improves the resistance to reduction, and 18:8 "S Mo steel," containing 2-4% of Mo, is suitable for many textile purposes such as dyeing, hypochlorite and peroxide bleaching, acetylation, concn. of AcOH, nitration, and dissolution in cuprammonium.

A. G.

Digby's cypritic alloy. T. W. LIPPERT (Iron Age, 1937, 140, No. 16, 55-63).—The properties of a corrosion-resistant stainless steel containing Cr 15, Cu 10% are reviewed.

R. B. C.

Short-time creep characteristics of stainless steels. S. I. WOLFSON and A. M. BORZDIKA (Met. & Alloys, 1937, 8, 294-296).—Creep characteristics for four steels at temp. within the range 400-600° were studied, including a new alloy steel (Mn 8.9, Cr 17.0, W 2.2, Ti 0.28%) which compared very favourably with the others.

S. J. K.

Microstructures of Mo-Max and 18:4:1 high-speed steels compared. R. G. KENNEDY, jun. (Met. & Alloys, 1937, 8, 289-293).—The two steels contained Mo 9.01, Cr 3.65, W 1.35, V 1.23% and W 18.0, Cr 3.90, V 1.04%, respectively. Photomicrographs after correct and incorrect heat-treatments show almost identical structures in the two steels.

S. J. K.

Metals and alloys used in Diesel locomotive cabs. E. F. CONE (Met. & Alloys, 1937, 8, 271-275).—Types of steel used and methods of construction are described.

S. J. K.

Influence of the cast structure on mechanical properties of hot-worked steel. K. KORNFELD (Stahl u. Eisen, 1937, 57, 870-873).—The effect of the cast structure of Ni and Cr structural steels was investigated by comparing the mechanical properties of the core and the outer zones of ingots. The impact strength increases towards the centre of the billet and the elastic limit and tensile strength fall slightly.

W. P. R.

Hot-rolling tests on unalloyed and high-alloy steels under different conditions of rolling. S. WEDDIGE (Stahl u. Eisen, 1937, 57, 913-921).—The steels investigated included low-C, high-C, low-C-high-Si, high-Cr, Ni-Cr, Ni-Cr-W, and Al steels. The apparatus used to determine the effect of temp. and composition on the turning moment, resistance to deformation in relation to % reduction, and the forward slip is described and the results are given in numerous graphs. At temp. <900° the mean resistance to deformation of the low-C steels is > that of high-C steels, but at higher temp. the reverse is the case.

W. P. R.

Endurance of gear steels at 250° F. [121°]. A. L. BOEGEHOLD (Trans. Amer. Soc. Met., 1937, 25, 245-259).—Fatigue tests on notched, rotating test-bars heated by oil at 121° showed that carburised and hardened steels containing varying % of C, Mn, P, Si, Ni, Cr, and Mo were less resistant to fatigue than at room temp. Under these conditions a martensitic was more fatigue-resistant than an austenitic surface structure. The decrease in the endurance limit caused by application of hot oil was about 10%. The fatigue life above the endurance limit in contact with hot oil was 10% of that at room temp.

R. B. C.

Brittleness of sil-chrome steels. M. V. PRIDANTZEV (Metallurg, 1935, 10, No. 5, 95-108).—Steels with C 0.20-0.60, Si 2.2-4.4, Cr 2.5-11, and Mo 0-0.39% were subjected to the Charpy test after heat-treatment. Steels with >2.4% Si were ductile after quenching from 820-850°, but very brittle after annealing or drawing. Quenched steels become brittle if heated above 500° and cooled slowly. Addition of 0.35% of Mo greatly decreases brittleness in steels with 2.4-3.2% Si.

Ch. Abs. (e)

Effects of various elements on corrosion-resistance of mild steels. T. MURAKAMI, H. ENDO, and H. SEKIGUCHI (Kinz.-no-Kenk., 1935, 12, 430—448, 459—477, 522—536).—Certain Cu-bearing steels have excellent resistance to corrosion by non-oxidising acid solutions (optimum 0.35% Cu under the annealing conditions used). The resistance of these Cu steels to solutions of salts and acids is increased by 2% of Al. Cr increases the resistance to corrosion by various solutions, 2% of Si increases the resistance to non-oxidising acid solutions, but Mn decreases the resistance. Addition of W, Mo, Ni, and Co to the steel does not improve corrosion-resistance; Ti and Si gave unfavourable results. Steels containing Cu, Cr, and Si or Al have a high resistance to corrosion by solutions; they also resist atm. oxidation at high temp. CH. ABS. (e)

Stability of metallic coatings, applied by spraying on steel, to sea-water and river water. I. J. KLINOV (J. Appl. Chem. Russ., 1937, 10, 1366—1379).—The protective action of Zn and Zn-Cd coatings against corrosion of C steel by sea-H₂O or river-H₂O is > that of Cu, Cu on Zn, or Sn coatings, and also that of Cu on Zn is > of Cu. The rate of corrosion is not \propto the thickness of the layer of Zn above 0.03 mm., nor appreciably increased by rise in temp. from 18° to 40°. R. T.

Metal-working industry in prehistoric America. E. W. NELSON (Metal Ind., N.Y., 1937, 35, 496—498).—Examples of coating with sheet Cu, Ag, and Au, and of fire-gilding or amalgam plating are described and illustrated. L. S. T.

Direct photo-electric determination of manganese and chromium in steels. G. THANHEISER and J. HEYES (Mitt. Kaiser-Wilh.-Inst. Eisenforsch., 1937, 19, 113—122).—The measurement of the relative intensity of the Mn and Cr lines in the flame spectrum by means of a photo-electric cell is described. The steel sample is dissolved and preferably the solution should contain 0—400 mg. of Mn or Cr per litre, as between these limits there is a direct proportionality between concn. and line intensity. The presence of other alloying elements in the steel does not interfere with the method. W. P. R.

Direct electric-resistance heating of steel for forging, upsetting, etc. F. P. PETERS (Met. & Alloys, 1937, 8, 281—287).—The available methods of heating are reviewed. The direct electric-resistance heating method is limited to stock $>2\frac{1}{2}$ in. in diameter and of uniform cross-section. Various applications of this method are described and the advantages and disadvantages discussed. S. J. K.

Steels for turbine rotor forgings and their heat-treatment. N. L. MOCHEL (Met. & Alloys, 1937, 8, 265—269).—Materials suitable for rotors in relation to their physical characteristics, including the stability of the finished article, are discussed. The requisite heat-treatments for plain and alloy steels, including the relief of stresses set up due to vol. changes in the crit. ranges, are considered. S. J. K.

Weldability of steels. J. BRILLIÉ and D. SÉFÉRIAN (Rev. Mét., 1937, 34, 286—288).—Three qualities of steels of 40, 50, and 60 kg./sq. mm.

tensile strength were welded under various conditions and the properties of the welds determined by the Chevenard micro-tensile machine. The results are plotted in the form of curves showing the variations of the tensile properties across the welds and in the base metal on each side of the weld. W. P. R.

Influence of nitrogen on the welding properties of steels. D. SÉFÉRIAN (Rev. Mét., 1937, 34, 288).—The bursting of welded cylinders made from basic Bessemer steel in preferential zones near the welds was caused by the presence of needles of Fe₃N in the microstructure of the steel. Similar cylinders made from acid open-hearth steel were free from the defect. The N content of this steel was < 0.01%. W. P. R.

Formation of metallic nitrides in steel welds. A. PORTEVIN and D. SÉFÉRIAN (Rev. Mét., 1937, 34, 281).—The conditions under which nitrides can be formed in steel welds are discussed. In arc-welding, an increase in welding current favours their formation, but this can be counterbalanced by the use of heavily coated electrodes. C, Mn, and Si tend to diminish, and Al and Cr to increase, the absorption of N₂. W. P. R.

Analytical study of chemical heterogeneity in welds. A. PORTEVIN and A. LEROY (Rev. Mét., 1937, 34, 277).—Microchemical methods using 10-mg. samples were used to ascertain the distribution of C, Si, S, P, and Mn in steel welds. W. P. R.

Mechanical tests on deposited [weld] metal. J. BRILLIÉ and A. ROUX (Rev. Mét., 1937, 34, 286).—Owing to the quenching effect of the mass of steel to be welded the strength of the weld cannot be assumed to be that of the deposited steel. In general, the properties of the weld metal is equiv. to that of the steel normalised at 900°. W. P. R.

Influence of method of welding on mechanical quality of the assembly. Y. MERCIER (Rev. Mét., 1937, 34, 282). W. P. R.

Widmanstätten structure in [steel] welds. N. T. BELAIEV and D. SÉFÉRIAN (Rev. Mét., 1937, 34, 281).—Widmanstätten structures in steel welds occur in two zones, viz., where the metal has been molten, and in the overheated region. Brittleness in welds is partly due to this structure, and methods, such as heat-treatment after welding, are recommended to eliminate its effects. W. P. R.

Examples of corrosion in welded structures. A. LEROY (Rev. Mét., 1937, 34, 281).—Conc. HNO₃, if first stored in Al vessels, is an active corrosion agent towards welded stainless (18/8) steel containing Ti. W. P. R.

Relation of corrosion to structural differences caused by oxyacetylene welding and cutting of steels. D. SÉFÉRIAN and A. LEROY (Rev. Mét., 1937, 34, 279—280).—Corrosion is influenced by heterogeneity within each individual crystal grain and by a modification in the constituents of the structure. Both cases arise in steels welded by the arc and oxyacetylene methods. W. P. R.

Fundamentals of standardisation in the field of corrosion. F. TÖDT (Chem. Fabr., 1937, 10, 479—482).—A review. C. E. H.

Standardisation work in the field of corrosion. Test in boiling liquid. DIN E 4852. M. WERNER (Chem. Fabr., 1937, 10, 494—496).—The text of a proposed specification is given. The specimen is heated in a flask, fitted with a reflux condenser, for ≤ 1 week, and weighed daily.

C. E. H.

Corrosion standardisation in chemical technology. M. WERNER (Chem. Fabr., 1937, 10, 482—486).—The possible and useful types of specification for the corrosion-resistance of metals are discussed.

C. E. H.

Recent American work on corrosion-testing. G. SCHIKORR (Chem. Fabr., 1937, 10, 491—494).—A review.

C. E. H.

Metallurgy of copper. (A) Distribution of manganese between matte and slag in the smelting of copper [ores]. F. S. WARTMAN, G. M. POTTER, and M. D. SCHMID. **(B) Graphic representation of the ratio of manganese distribution between matte and slag.** M. D. SCHMID. **(C) Flash-roasting of copper concentrates.** F. S. WARTMAN [with G. M. BUTLER, jun., R. C. MEADERS, J. D. MOORE, C. L. LABEKA, and M. W. CLARDY] (U.S. Bur. Mines, Rept. Invest. 3340, 1937, 3—9, 11, 13—22).—(A) The distribution ratio (R) of Mn between slag and matte is always > 1 in Cu-matte smelting with a high Mn content of the charge. The % Mn in the matte for a given % Cu in the matte and a given % SiO_2 in the charge is always inversely $\propto \log_{10} R$. When the slag contains $< 30\%$ of SiO_2 R decreases slightly with increasing basicity of the slag, but when the SiO_2 content is $> 30\%$ R is independent of the % SiO_2 ; in all cases the relative amounts of slag and matte and the presence of impurities in the slag have no effect on R .

(B) A space model correlating R with % Cu in the matte, % SiO_2 in the slag, and % Mn in the matte is shown.

(c) In the flash-roasting of flotation Cu concentrates particle size < 100 -mesh or temp. between 1000° and 1250° has no effect on the S content of the calcine. An updraught effects more complete elimination of S than a downdraught and the SO_2 content of the gas is 14% compared with 12%. The calcine contains much Cu ferrite and gives a low yield of Cu to acid-leaching. The MacDougall roaster is preferred to flash-roasting for modern practice.

A. R. P.

Developments in non-ferrous [copper] alloys. D. K. CRAMPTON (Met. Prog., 1937, 32, 569—574).—A review.

R. B. C.

Copper alloys as bearing metals. D. P. C. NEAVE and W. B. SALLITT (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group I, 190—197).—A description of the various alloys in common use, their properties, advantages, and limitations.

H. C. R.

Foundry technique for brass, bronze, and nickel-silver. J. DERDINGER (Bull. Assoc. Tech. Fond., 1937, 11, 208—215).—The conditions which lead to the formation of blowholes, and the design and making of moulds, are discussed. Precautions in melting the alloys are given. With Ni-silver it is

necessary to take greater care and details are given including the use of deoxidisers.

S. J. K.

Value of the apparent density in casting bronze. C. DENNERY (Bull. Assoc. Tech. Fond., 1937, 11, 216—218).—The factors controlling the apparent d are discussed and the use of such d determinations as a check on the soundness of castings is advocated.

S. J. K.

Apparent density of castings. A. PORTEVIN (Bull. Assoc. Tech. Fond., 1937, 11, 218—219).—The val. for assessing the defectiveness of a casting of accurate determination of the distribution of apparent d is stressed. This method may fail to reveal "two-dimensional" flaws, but on the whole these are the less important in foundry work.

S. J. K.

Physical chemistry of zinc recovery by smelting. M. BODENSTEIN (Z. Elektrochem., 1937, 43, 461—469).—A review of recent work on the reaction between ZnO and C and on the use of vertical retorts for Zn smelting.

A. R. P.

Treatment of by-products formed in the hot-dip galvanising process. W. G. IMHOFF (Metal Ind., N.Y., 1937, 35, 292—294).—Methods of reclaiming Zn dross and black and white skimmings are described.

L. S. T.

Spectrographic determination of impurities in cadmium. A. KAISIN (Rev. Univ. Min., 1937, 13, 337—343).—The technique for determining Cu, Al, Fe, Zn, Sn, Pb, Tl, and Ni by means of the graphite arc and Breckpot's rotating stepped logarithmic sector method is described.

R. B. C.

Properties of cadmium and mercury with small percentages of nickel. T. E. NORMAN and O. W. ELLIS (Amer. Inst. Min. Met. Eng. Tech. Publ. 850, 1937, 4 pp.; Met. Tech., 1937, 4, No. 7).—The compressive and tensile strengths, hardness, and ductility of Cd-Hg-Ni alloys containing Hg 5—40 and Ni 1% were investigated. These alloys are inferior to plain Cd-Ni alloys, but superior to the commoner Sn-base alloys.

R. B. C.

Development of the nickel industry. (Str) R. MOND (Chim. et Ind., 1937, 38, 835—839).

Assay of nickel in ores. R. D. MIDSON (Chem. Eng. Min. Rev., 1937, 29, 196).—The ore is dissolved in HNO_3 and H_2SO_4 , the Cu removed by boiling with Al foil, and the filtrate oxidised with HNO_3 , treated with 3 g. of tartaric acid, and neutralised with aq. NH_3 . The Ni is then pptd. with dimethylglyoxime, the ppt. dissolved in HNO_3 , and the Ni determined by titration with KCN in the usual way.

A. R. P.

Use of nickel in magnetic alloys. K. HONDA (Japan Nickel Rev., 1937, 5, 430—439).—The magnetisation and magnetostriction of Fe and Ni are discussed, and compositions of a no. of alloys with high μ are given.

S. J. K.

Metallic materials containing nickel. T. MISHIMA (Japan Nickel Rev., 1937, 5, 463—503).—Compositions and properties of Ni alloys are summarised. Special attention is paid to the inter-cryst. corrosion of 18 : 8 stainless steel.

S. J. K.

Alloys of high permeability and high electric resistance. K. MIHARA (Japan Nickel Rev., 1937,

5, 504—516).—Ni-Fe alloys with additions of Cu, Cr, and Mn were made and investigated. Some promising new high- μ alloys have been evolved.

S. J. K.

Constitutional diagrams of alloys with nickel as the chief constituent. H. NISHIMURA (Japan Nickel Rev., 1937, 5, 440—462).—The known constitutional diagrams for binary alloys of Ni are classified and arranged according to the periodic system. The diagrams for the Ni-Fe, Ni-Co, Ni-Cu, Ni-Cr, Ni-Mo, Ni-Al, Ni-Zn, Ni-Fe-Co, Ni-Cr-Fe, Ni-Cu-Cr, Ni-Cu-Zn, and Ni-Cu-Al systems are described in detail.

S. J. K.

Scientific principles of tin smelting. III. Velocity of reduction of stannic oxide in presence of different reducing agents. J. KLÄRDING (Metall u. Erz, 1937, 34, 556—558, 580—584; cf. B., 1937, 570).—The reduction of SnO₂ by different coke and coal fuels at 700—900° has been studied. The velocity of reduction at a given temp. depends on the gas content and nature of the fuel. In the lower range of temp. the products of reaction are Sn, CO, and CO₂, but CO₂ does not occur at higher temp.

E. S. H.

Wetting of metals by metals with particular reference to tinning and soldering. E. J. DANIELS and D. J. MACNAUGHTAN (Tech. Publ. Internat. Tin Res. and Dev. Council, 1937, B, No. 6, 10 pp.).—Published work is reviewed and an experiment on the capillary rise of molten Sn in a Cu tube is reported.

E. S. H.

Bearing metals [and their substitutes] in power-station operation. E. R. BECKER (Arch. Wärmewirts., 1937, 18, 217—221).—German restrictions on the use of Sn, Pb, bronze, etc. have led to the development of substitutes for bearing metals formerly in use. Progress in the application of Al alloys, e.g., Quarzal, Aloa, and Aeterna, cast Fe, wood, and synthetic resins is reviewed.

R. B. C.

Factors that may determine the service life of tin-base bearing metals. D. J. MACNAUGHTAN (Inst. Mech. Eng., Lubrication discussion, Oct., 1937, Group I, 170—177).—The possibility of failures of bearings of these metals under conditions of severe alternating stresses in internal-combustion engines being due to tensile stresses caused by variations in temp. of the metal surface is discussed. Up to 7% of Sb improves the service life, but >2% of Cd and as little as possible of Pb should be present.

H. C. R.

Determination of chromium in chromite. G. F. SMITH and C. A. GETZ (Ind. Eng. Chem. [Anal.], 1937, 9, 518—519; cf. B., 1937, 1062).—The chromite is dissolved by heating with H₂SO₄ + H₃PO₄, and oxidised at 215° by addition of HClO₄. KMnO₄ is added to remove the H₂O₂ always formed in perchloric oxidations. After addition of dil. HCl, and destruction of the KMnO₄ and removal of Cl₂ by boiling, the Cr₂O₇²⁻ is titrated at room temp. with 0.05N-FeSO₄, using Ferroin (o-phenanthroline-Fe²⁺) as indicator. The method is rapid, accurate to within <0.2%, and has been applied to all types of chromite ore and Cr refractories. Finely-ground chromite ore absorbs

moisture on keeping and should be dried at 105—110° before analysis.

L. S. T.

Metallic cementation. VII. Cementation by manganese powder. T. KASE (Kinz.-no-Kenk., 1935, 12, 478—483, 507—513; cf. B., 1937, 47).—Mn diffuses into Fe, Ni, and Cu at >600°. For Fe the rate of diffusion increases abruptly at the A3 point. Data for the rate and depth of penetration at 600—1100° and for the hardness of the product are recorded. Fe and Ni cemented with Mn are readily attacked by 10% H₂SO₄, 10% or conc. HCl, or HNO₃, whilst Cu is not corroded by 10% H₂SO₄ and HCl, or by conc. HCl.

CH. ABS. (e)

Sulpho-telluride [gold ore] problem. H. H. SMITH (Chem. Eng. Min. Rev., 1937, 29, 333—341).—Recent work on the recovery of Au from telluride ores is critically discussed. Lake Shore ore (W. Australia) contains Au 10—13 dwt./ton and FeS₂ 1.6—2.2%; grinding to 92% <40 μ . followed by cyaniding in a pulp containing CaO 5, PbO 1.5—2, and KCN 1—1.2 lb./ton results in a 96% extraction of the Au, which is not improved by roasting. Fine grinding and long time of contact with the aq. KCN are essential for high Au extraction.

A. R. P.

Milling of copper-arsenical gold ore. E. GRENVILLE-HOLT (Chem. Eng. Min. Rev., 1937, 29, 373—376).—Direct cyanidation of a rich Australian Cu-As sulphide Au ore led to an extraction of >85% when the ore was ground to pass 200-mesh to liberate the Au from the sulphides, but the CN' consumption was very high. Much better results were obtained by removing the Cu minerals by flotation and cyaniding the tailings; the flotation concentrates were sufficiently rich to smelt to Cu matte for direct refining.

A. R. P.

Treatment of low-grade gold-tin concentrate. G. B. O'MALLEY (Chem. Eng. Min. Rev., 1937, 29, 186—188).—The concentrate obtained by jigging the dredge products at Eldorado, Victoria, contains Au 5—10 oz./ton and Sn 5—10% together with quartz, tourmaline, corundum, zircon, and ilmenite. The Au is almost completely recovered by barrel-amalgamation, using 20—30 oz. of Hg/ton and a pulp containing 30% of solids. The tailings from this operation are treated on Wilfley tables and the concentrates are dried and then separated magnetically. The final product contains 75% of Sn (95% recovery), the magnetic product 0.35% of Sn, and the table tailings 0.5% of Sn.

A. R. P.

Preparation of pure gold. J. S. STAS (Bull. Soc. chim. Belg., 1937, 46, 377—379).—A memoir. Purification by chemical treatment is described.

E. S. H.

Flotation of pyrite. H. W. GARTRELL (Chem. Eng. Min. Rev., 1937, 29, 141—144).—The factors which cause flotation and depression of auriferous pyrite are discussed.

A. R. P.

Local and superficial analysis of metals or alloys by means of the spark. H. TRICHÉ (Bull. Soc. chim., 1937, [v], 4, 1714—1723).—A review of procedure and applications.

E. S. H.

Chemical methods of treating minerals. E. BIERBRAUER (Z. Elektrochem., 1937, 43, 469—473).

—The physicochemical basis of flotation processes is explained and the use of flotation methods for treating complex Zn-Pb, Cu-Fe, phosphate, and sylvine-carnallite ores, and for cleaning coal, is briefly described. The magnetising-roasting of Fe ores is also discussed. A. R. P.

Physical chemistry in metallurgical operations. W. SAVELSBERG (*Z. Elektrochem.*, 1937, **43**, 474—479).—The purification of the electrolyte in the recovery of Zn, Cu, and Ni from their ores, the mechanism of liquation, the partition of metals between slag and matte or between two matte layers, the Harris Pb-refining process, the reduction of SnO₂ to Sn by CO, and the purification of metals on the converter principle are discussed. A. R. P.

Metallurgical reactions with especial reference to the part played by gases. R. SCHENCK (*Z. Elektrochem.*, 1937, **43**, 438—450).—The part played by gases in roasting, smelting, and reduction processes is discussed. A. R. P.

Gases in metals. C. J. SMITHELLS (*Metal Treatment*, 1935, **1**, 165—171; cf. *A.*, 1935, 25).—Only those gases which are adsorbed and dissociated on the surface will diffuse into a metal. The solubility of gases in metals is approx. \propto the square root of the pressure. CH. ABS. (e)

Colloidal phenomena in metals. IV. Further investigations on gases in metals. J. A. KLJATSKHO (*J. Appl. Chem. Russ.*, 1937, **10**, 1329—1338; cf. *A.*, 1936, 1460).—Blistering of Al alloys is due to a chain reaction between activated mols. of adsorbed H₂O and Al; the chain may be broken by heating the metal in an oxidising atm. (air, O₂, Cl₂), and blistering is then not observed. Methods of determining the gas content of Al alloys are described. The gas content is raised by inclusion of surface-active constituents (Si, Cu) in the alloy, and is lowered by inactive ones (Mg). R. T.

Variability in scleroscope hardness testing [of metals]. W. HENGEMÜHLE and E. CLAUSS (*Stahl u. Eisen*, 1937, **57**, 657—660).—The effect of the shape, wt., speed, and fall of the hammer in hardness determinations by the scleroscope is discussed. W. P. R.

Dust control in the foundry. C. A. SNYDER (*Metal Ind.*, N.Y., 1937, **35**, 349—350).—Hazardous operations and types of dust collectors are described. L. S. T.

“Modifying” phenomenon and its probable relation to properties of non-ferrous alloys. C. H. LORIG and R. W. DAYTON (*Trans. Amer. Found. Assoc.*, 1935, **43**, 262—273).—The “silicate-slime” or “slag-cloud” hypothesis developed to explain graphite formation in cast Fe can be used to account for certain inconsistencies in the properties of non-ferrous cast alloys. CH. ABS. (e)

[Metal] piston rings and cylinder liners [for internal-combustion engines]. G. WILLIAMS (*Automobile Eng.*, 1937, **27**, 299—302, 326—336).—The selection and testing of materials used for the above are discussed and existing knowledge relating to cylinder wear is summarised. Ni-Cu-Cr cast Fe is a suitable material for rings and liners. R. B. C.

Elongation and speed of extension of metals under constant tensile load. A. POMP and W. LANGE (*Mitt. Kaiser-Wilh.-Inst. Eisenforsch.*, 1937, **19**, 51—63).—Experiments on Pb, Zn, and Cu test-pieces in a special creep-testing apparatus in which the specimens were maintained at a const. temp. ($\pm 0.1^\circ$) are described. Time-elongation and speed of elongation-time curves for temp. up to 60° are given. Irregularities in the curves such as would be expected from alternate work-hardening and recrystallisation, or from alternating slip along different glide planes in the metal crystals, were not observed. W. P. R.

Deformation of the macrostructure of some two-phase alloys by cold-rolling. H. UNCKEL (*J. Inst. Metals*, 1937, **61**, Advance copy, 355—376).—Rolling experiments on various brasses, 6% Fe-Cu alloy, 10% Sn-bronze, silumin, and 8% Cu-Al alloy show that owing to differences in hardness and plasticity between the matrix and the embedded phase(s) additional plastic flow occurs in the vicinity of the second-phase particles, which sets up stresses leading to an increase in brittleness. When the inclusions are harder than the matrix their deformation is $<$ that of the matrix and becomes nil if the stress necessary for their deformation exceeds a certain val., but when they are softer than the matrix their deformation is $>$ that of the matrix. In general, deformation occurs in such a way that the work required becomes a min. A. R. P.

Addition elements in metallic welding. A. B. KINZEL (*Rev. Mét.*, 1937, **34**, 278).—Si, Mn, Cr, Ni, Mo, Zn, P, and Nb are the chief elements found useful for improving the quality of welds in both ferrous and non-ferrous metals. W. P. R.

Suitability of welds for case-hardening. A. ROUX (*Rev. Mét.*, 1937, **34**, 291).—The favourable influence of Mn in filler rods or electrodes is indicated if welds are to be subsequently case-hardened. W. P. R.

Surface-hardening by deposition of stellite. A. B. KINZEL and C. W. DRURY (*Rev. Mét.*, 1937, **34**, 291).—Advantages gained by welding on stellite to worn surfaces or parts subjected to abrasion are enumerated. W. P. R.

Internal stresses in welds—their cause and effect. A. B. KINZEL (*Met. & Alloys*, 1937, **8**, 277—280).—The nature of the stresses set up during welding, in relation to the effect of subsequently applied stresses, is considered. Principles by which the need for stress-relieving heat-treatment may be decided are given. S. J. K.

Fundamentals of spray-coating equipment [for metals]. A. W. CHRISTENSEN (*Metal Ind.*, N.Y., 1937, **35**, 288—289).—The spray gun, compressor, pressure regulator, and oil and H₂O extractor are described and illustrated. L. S. T.

Metal deposits obtained by metal spraying. J. FASSBINDER and P. SOULARY (*Rev. Mét.*, 1937, **34**, 291—292).—The properties of sprayed metal coatings on mild steel are reported. The use of N₂ as the projecting gas diminishes the hardness of the coating when metals of high m.p. are used, but increases the

hardness of sprayed Al or Zn. The adherence of coatings on sand-blasted mild steel is better when using the wire pistol. The corrosion-resistance of sprayed Zn, Cd, Al, and "studal" on mild steel is good and compares very favourably with that of paints and varnishes. W. P. R.

Recent developments in the study of metallic corrosion. F. MÜLLER (Chem.-Ztg., 1937, 61, 917—920).—A review.

Separation of small quantities of beryllium from large quantities of aluminium in aluminium light-metal alloys. E. PACHE (Chem.-Ztg., 1937, 61, 880).—5 g. of the alloy are dissolved in 100 c.c. of 10% aq. NaOH, and the solution is diluted with 600 c.c. of hot H₂O and boiled for 30 min. The greater part of the Al and Zn passes into solution, whereas the Be is pptd. as Be(OH)₂ with the hydroxides of Fe, Mn, etc. After filtration, the ppt. is washed, dissolved in warm dil. HNO₃, and the solution added in small portions (with vigorous shaking) to 100 c.c. of freshly-prepared 40% aq. NaOH. This is made up to exactly 500 c.c. and filtered; 300 c.c. of the filtrate are then acidified with HNO₃, made alkaline with aq. NH₃, boiled, and filtered. The ppt., consisting of Be(OH)₂ and Al(OH)₃, is again dissolved in 5 c.c. of 10N-KOH and the solution diluted with 500 c.c. of hot H₂O and boiled for 5 min. The pptd. Be(OH)₂, formed by hydrolysis of the beryllate, is collected, washed, dried, ignited, and weighed as BeO. A. B. M.

Beryllium bronze. D. G. BUTOMO (Metallurg, 1935, 10, No. 5, 114—132).—Be containing Fe 8.72 and Al 3.16% was used to produce bronze with 2—2.5% Be. The best mechanical properties were obtained by quenching from 800° and drawing at 300—350°. Fe raises the drawing temp. and improves the mechanical properties. The alloys can be rolled hot or cold. CH. ABS. (e)

Volume change in the solidification of magnesium. E. PELZEL and F. SAUERWALD (Metallwirts., 1937, 16, 1155).—The contraction in vol. is 3.97% on solidification, and 5.46% more on cooling from the m.p. to room temp. C. E. H.

Magnesium alloys. H. HERTRICH (Metallwirts., 1937, 16, 1152—1154).—Recent developments in the use of Mg alloys are discussed. C. E. H.

Ternary alloys of magnesium based on the magnesium-zinc system. K. NAGURO (Tetsu-to-Hagane, 1935, 21, 812—818).—Additions of 0.5, 1, and 2% of each of the elements Ni, Co, Cu, Ag, Ca, Cd, Hg, Al, Ti, Si, Sn, Pb, As, Sb, Bi, Cr, Te, and Mn were made to Mg alloys with 2, 3, or 5% Zn. Ni, Co, Cu, Al, Ti, Pb, and Bi decreased, and As, Ca, Cd, Hg, and Mn increased, the resistance to 0.1N-NaCl and artificial sea-H₂O. The corrosion is not lessened by heat-treatment, except for alloys containing Si, Sn, Ti, or Pb. Cu, Ni, Ag, Al, Si, and Bi harden the alloys. CH. ABS. (e)

Magnesium alloy [castings]. W. G. HARVEY (Auto. Eng., 1937, 27, 449—450).—The types available and their mechanical and chemical properties are reviewed. R. B. C.

Remelting of aluminium in the foundry. H. ROHRIG (Engineer, 1937, 164, 375—376).—To minimise loss of metal the flux must be fluid so that particles of metal are not retained in the slag, and the scrap should be de-oiled before melting. Materials for fluxing and degasifying are suggested. A. R. PE.

Internal standard method of spectrographic analysis as applied to "pure" aluminium and magnesium alloys. H. K. WHALLEY (J.S.C.I., 1937, 56, 438—441T).—The internal standard method of estimating strengths of spectral lines due to certain elements, and hence the amounts of those elements present, is applied to the spectrographic determination of Fe and Si in commercial "pure" Al. A modification of this method, in which a composite spectrum is obtained from the spark struck between Mg alloy and Ni, is used for the analysis of Mg alloys.

Determination of silicon in aluminium. (A) L. H. CALLENDAR. (B) H. V. CHURCHILL, R. W. BRIDGES, and M. F. LEE (Ind. Eng. Chem. [Anal.], 1937, 9, 533—534).—(A) A criticism (cf. B., 1937, 687). None of the samples of metal used for the A.S.T.M. comparison between the author's NaOH method (A., 1932, 844) and the official tri-acid method is such as would be expected to show a marked difference in the % of Si by the two methods. The serious errors that can be introduced, particularly in metallurgical investigations involving heat-treatment, by the use of the latter method are re-stated.

(B) The data given previously (Churchill *et al.*, *loc. cit.*) referred to samples annealed at >500°. New determinations confirm the above view that when applied to certain Al alloys that have been heated to <550° the tri-acid method may yield low results. In agreement with the preceding author, the basic umpire method for the analysis of Al alloys should use the NaOH method of decomp. L. S. T.

Electrical conductivity [and tensile strength] of aluminium for overhead wires. A. SCHULZE (Aluminium, 1937, 19, 584).—The mean vals. of electrical conductivity and tensile strength for hard-drawn, 2—3-mm. diameter Al wires, supplied by seven different German firms were 2.810 μΩ/c.c. and 27,024 lb./sq. in., respectively, as compared with the international standards of >2.828 and <21,335, respectively. A. K. G. T.

Welding of light aluminium alloy. F. R. EGGELMANN (Rev. Mét., 1937, 34, 288—289).—An Al alloy containing Si 0.9, Mn 0.5, Mg 1.0% was welded and tested at room temp. and at -180°. The elongation was reduced by welding from 18% to 4—7%, but the weld maintained its properties at the low temp. W. P. R.

Welding of aluminium bronze. A. BOUTTÉ (Rev. Mét., 1937, 34, 289).—The formation of Al₂O₃ in the molten metal, and of an oxide film on the solid surfaces, necessitates the use of a flux (cryolite + NaF) and a reducing flame. The filler metal should contain excess of Al to compensate for the loss of about 1% which always occurs. W. P. R.

Aluminium [alloys] in the salt industry. R. CHEVILLOTE (Rev. l'Aluminium, 1937, 14, 849—852).—Al alloys, *e.g.*, Almasilium (Al, Si, Mg) and

Duralinox (Al, Mg, Mn), are specially suitable for NaCl plant. Where extra hardness is required, *e.g.*, for screw conveyors, heat-treated alloys containing a small amount of Cu are used. A plant, which includes a multistage dryer, is described. I. C. R.

Progress in light[-metal] alloys. A. J. DORNBLATT (Met. Prog., 1937, 32, 575—581).—A review. The mechanical properties of various Al alloys are tabulated. R. B. C.

Standardisation of corrosion tests for light metals. P. BRENNER (Chem. Fabr., 1937, 10, 486—491).—Tests employing salt-spray, intermittent immersion, and immersion in moving liquids are discussed with respect to the reproducibility of the results and the agreement with field tests. C. E. H.

Quantitative spectral analysis, particularly of light metals. H. KAISER (Metallwirts., 1937, 16, 1095—1101).—The effects of operating conditions on the accuracy of the results have been investigated for an Al-Mg alloy. Conditions under which the structure of the alloy does not affect the results are given. C. E. H.

Photometric methods in the analysis of light metals. H. GINSBERG (Metallwirts., 1937, 16, 1107—1112).—Comprehensive data are given regarding the colorimetric determination of Ti, Cr, V, Cu, and Fe in Al and its alloys. C. E. H.

Metal rectifiers for electroplating. ANON. (Metal Ind., N.Y., 1937, 35, 281—282).—Recent developments in dry metal rectifiers make them suitable for electroplating installations. L. S. T.

Rochelle salt copper-plating bath. A. K. GRAHAM and H. J. READ (Metal Ind., N.Y., 1937, 35, 559—561).—The p_H characteristics of this type of bath and of its constituents are reported. L. S. T.

Electroplating metals in colours. ANON. (Metal Ind., N.Y., 1937, 35, 503—504).—A new process is described in which the metal to be finished is made the cathode in an electrolyte of org. Cu salts with a Cu anode; a full range of colours can be obtained and the process is suited to the commercial requirements of colour-finishing. L. S. T.

Purifying nickel-plating solutions by electrolysis. L. WEISBERG (Metal Ind., N.Y., 1937, 35, 451—453).—Removal of metallic and some types of org. impurities from these solutions by electrolysis at regulated c.d. is discussed. L. S. T.

Electrodeposition of copper-nickel-zinc alloys from cyanide solutions. III. C. L. FAUST and G. H. MONTILLON (Trans. Electrochem. Soc., 1938, 73, Preprint 2, 11—25; cf. B., 1935, 554).—The effect on the composition of the deposit of the following bath additions has been studied: KCl, NH_4Cl , aq. NH_3 , and K_2CO_3 . Data are appended on the changes in the respective electrode potentials of Cu, Ni, and Zn accompanying sustained electrolysis. The corrosion-resisting properties of deposits of varying composition are compared. J. W. C.

Commercial electrodeposition of [bright] cobalt-nickel alloys. L. WEISBERG (Trans. Electrochem. Soc., 1938, 73, Preprint 1, 1—10).—The bath

contains $NiSO_4$ 240, $NiCl_2$ 45, HCO_2Na 35, $CoSO_4$ 15, H_3BO_3 30, $(NH_4)_2SO_4$ 2.5, and CH_2O 1 g. per litre. The optimum working conditions are p_H 3.7, c.d. 40 amp./sq. ft., and temp. 60°. Vigorous agitation is essential. The control of the solution and of the factors affecting the brightness of the plate are fully discussed. J. W. C.

Nickel-cobalt alloy plating from low- p_H acid sulphate solutions. C. B. F. YOUNG and C. EGERMAN (Trans. Electrochem. Soc., 1937, 72, Preprint 25, 377—388).—The deposition of Ni-Co alloys from strongly acid sulphate solutions, using a rotating cathode, is investigated. Increase in degree of agitation, temp., or $[H^+]$ causes an increase in the Co content of the alloy, whereas an increase in c.d. causes a decrease in Co content. Addition agents have no effect on the composition of the deposit. J. W. C.

Behaviour of alloy anodes in deposition of silver-cadmium alloys from cyanide baths. C. L. FAUST and D. J. HENRY (Trans. Electrochem. Soc., 1937, 72, Preprint 26, 389—409).—Good alloy deposits of the same composition as the anodes can be obtained consistently from cyanide solutions operated, respectively, with 10% Ag-90% Cd anodes and a c.d. of 16 amp./sq. ft., and with 90% Ag-10% Cd anodes and a c.d. of 5—10 amp./sq. ft. In the former case, where the anodes have a duplex structure, c.d. control must be closer. J. W. C.

Replenishing the metal content of cyanide [plating] baths. N. S. HALL (Platers' Guide, 1936, 32, 17—18).—Free NaCN is one of the determining factors in maintaining good throwing power. The $[NaCN]$ must be maintained at the optimum val. CH. ABS. (e)

Cracking of electrolytic chromium deposits. S. M. KOTSCHARGIN (J. Appl. Chem. Russ., 1937, 10, 1364—1365).—Radial fissures are observed in the Cr-plating of gramophone-disc matrices when the thickness of the plating is $>3 \mu$. R. T.

Theory of electrolytic chromium plating. III. R. WEINER (Z. Elektrochem., 1937, 43, 808—812; cf. B., 1936, 1044).—Polemical against Müller (B., 1937, 798). J. W. S.

Measurement of the thickness of tin coatings on steel by a magnetic and an electromagnetic method. B. CHALMERS, W. E. HOARE, and W. H. TAIT (Tech. Publ. Internat. Tin Res. and Dev. Conn., 1937, A, No. 66, 9 pp.).—Apparatus and technique for the rapid determination of the thickness of a non-magnetic coating on a magnetic base or a magnetic coating on a non-magnetic base are described. Tests with tinfoil give results in good agreement with those obtained by chemical analysis. E. S. H.

Stripping metal deposits. N. HALL (Metal Ind., N.Y., 1937, 35, 283—284).—Methods for the removal of Ni, Cr, Rh, Ag, Au, and Cu from different basis metals are described. L. S. T.

Electroplating aluminium on metals. II. N. KAMEYAMA, T. YOKOYAMA, S. SATO, T. INOUE, H. IIDA, and Y. TORII (J. Electrochem. Assoc. Japan, 1935, 3, 223—232; cf. B., 1936, 552).—The surface

to be plated must be free from fats, oils, and rust, and highly polished. Deposition takes place at 110—130° in a closed cell, with AlBr_3 + 16—18% of KBr as electrolyte and an Al anode. This should be free from Fe . A c.d. of <1 amp./sq. dm. is used. A 10% a.c. superposition on the d.c. favours smooth deposits. The deposition potential is 0.2—0.4 v. The current efficiency with a Pb cathode in an Fe -free bath is nearly 100%. It falls to 50—70% when Fe is present. Neither org. addition agents nor org. Al salts give satisfactory results. CH. ABS. (e)

Penetration of electrolytes used in the anodic oxidation of aluminium. H. RÖHRIG (Aluminium, 1937, 13, 585—586).—Experiments show that the oxide film which affords Al protection against corrosion is not solely a surface effect, cavities below the surface being lined with a similar film. The thickness of the film ($>16 \mu$) is measured microscopically and correlated with cavity depth, anodic oxidation being obtained by the passage of a.c. or d.c., using $\text{H}_2\text{C}_2\text{O}_4$ electrolyte. A. K. G. T.

Gloss measurement.—See I. Heating coke ovens by blast-furnace gas. Corrosion by oils. Metal for oil-cracking units. Lubrication of antifriction bearings and in wire-drawing. Cutting fluids etc.—See II. Corrosion in prep. of Alizarin pure blue.—See IV. Fixation of S from smelter smoke.—See VII. Ni alloys in glass industry. Enamels for Fe . Removing enamel from metal. Frothing in vitreous enamelling. Acid Bessemer refractories.—See VIII. Determining p_{H} of Ni solutions. Spectral analytical methods. [Uses of] the rectifier.—See XI. Plastics for metals. Testing rust-inhibitive pigments. Rust-preventive paints. Painting metals. Lacquers for metals. Lacquer for Cr-plating. Metal-work finishes.—See XIII.

See also A., I, 607, Systems Al-Li and Al-Be . Al -rich Al-Ag alloys. 608, Al-Ag , Fe-Mn , Fe-Zn , Mg-Ca , Cu-Sn , Cu-Ga , Cd-In , and Pt-Mo alloys. Transformations in β -brasses. Sn bronzes. 608—9, Thermochemistry of alloys. 609, Polymorphic transformation of Co . Systems Cu-Zn-Sn , Mg-Al-Cd , Mg-Ag-Cd , and Sb-Cd-Sn . $\text{Mg}_3\text{Cu}_{11}\text{Al}_{11}$. 610, Influence of Cr on the γ -field of Fe-Ni alloys. X-Ray study of ternary alloys. Inverse segregation. Solubility of gases in metals under pressure. 611, Absorption of H_2 by Ag , Rh , and W . 620, Passivity of Fe and steel in HNO_3 . Corrosion of Fe in KI-I solution. 623, Reactivity of binary alloys. 625, Electrolytic separation of W . Electrocrystallisation of metals. 628, Malleable Ti and Zr . 631, Analysis of galena and pyrites. 632, Titration of Cu with alkali cyanide.

PATENTS.

Manufacture of cast iron [for enamelling]. C. E. WILLIAMS, D. E. KRAUSE, and C. H. LORIG, ASSRS. to BATTELLE MEMORIAL INSTITUTE (U.S.P. 2,048,309, 21.7.36. Appl., 27.5.33).—The inner surface of the mould in which the metal is cast is coated with Cu or a Cu -alloy powder, Cu_2O , or CuO so that

the outer layers of the casting are converted into a Cu-Fe alloy to which enamels readily adhere.

A. R. P.

Heat-treatment of metal [cast iron]. C. F. LAUENSTEIN, ASSR. to LINK-BELT CO. (U.S.P. 2,048,748, 28.7.36. Appl., 12.5.34).—Cast Fe is heated to a temp. (800°) sufficient to produce recombination of C , quenched in oil, and reheated at 630° in a salt bath containing KCN to produce case-hardening without internal recombination of C .

A. R. P.

Manufacture of [copper-iron] alloys. K. M. SIMPSON (U.S.P. 2,048,824, 28.7.36. Appl., 13.5.32. Renewed 21.11.35).— Fe is refined until the C is reduced to <0.2%, >5% of Cu is added to the molten metal, and the bath is deoxidised at 1550° until the greater part of the oxides has been eliminated; the metal is then tapped into a ladle, the gases are allowed time to escape, and the alloy is cast at <1450°.

A. R. P.

(A, C) Iron-nickel-titanium alloys. (B) [Heat-treatment of [titanium-iron] alloys. (D) Nickel-chromium-iron-titanium alloys. N. B. PILLING and P. D. MERRICK, ASSRS. to INTERNAT. NICKEL CO., INC. (U.S.P. 2,048,163—5 and 2,048,167, 21.7.36. Appl., [A] 15.4.29, [B] 31.8.31, [C] 1.10.31, [D] 11.4.36).—The alloys consist of (A) Fe with Ni 2—50 and Ti 1—10%, (B) Fe with 3—6% Ti , (c) Ni 50—99 (>85), Ti 1—10, and Fe 49—5 (<15)%, (D) Fe with Ni 2—50, Cr 3—30, and Ti 1—10%. Heat-treatment consists in quenching from the solid-solution range and reheating at 500—750°.

A. R. P.

Refining of metals [steel]. J. W. FLANNERY (U.S.P. 2,049,004, 28.7.36. Appl., 27.1.34. Can., 12.11.30).— S , O , and N are removed from steel by melting it with a 50:38:12 mixture of CaC_2 , SiO_2 , and Na_2CO_3 ; the slag melts to a fluid liquid before the metal and the latter then melts and falls drop by drop through the slag to effect a thorough refining.

A. R. P.

Straightening and testing of long metal articles [e.g., steel sucker rods for oil wells]. F. B. BAYLESS, ASSR. to OIL WELL SUPPLY CO. (U.S.P. 2,049,830, 8.4.36. Appl., 27.10.32).—The steel is heated, quenched, and tempered in the usual way, but during quenching the rods are subjected to a small tensile stress to straighten them.

A. R. P.

Metallic filling materials [for repairing imperfections in steel sheets for automobile bodies]. W. WYSS, ASSR. to SOC. ANON. A. SAURER (U.S.P. 2,048,044, 21.7.36. Appl., 29.11.35. Ger., 30.10.34).—Claim is made for the use of an 85:15 Cd-Sn alloy.

A. R. P.

(A) Heat-treatment of steel. (B) Treatment of magnetic material [silicon-iron]. (A) A. A. FREY and S. L. BURGWIN, (B) T. D. YENSEN, ASSRS. to WESTINGHOUSE ELECTRIC & MANUFACTURING CO. (U.S.P. 2,050,305 and 2,050,408, 11.8.36. Appl., 23.10.35).—(A) Si steel is coated with an $\text{Fe}_2\text{O}_3\text{-Al}_2\text{O}_3$ paste and heated first at 700° in H_2 to oxidise the surface layers, then at 800—900° to remove all the C , and finally at 900—1300° to deoxidise the metal and produce a desirable grain size showing a low hysteresis loss. (B) In the first stage, heating is continued until the

surface layers contain 0.05—0.3% O and decarburisation is effected at 900—1300° in H₂, having a low H₂O content and flowing at the rate of 0.1—16 litre/min./kg. of metal. A. R. P.

Case-hardening [of steel]. E. VAN DER PYL, Assr. to NORTON CO. (U.S.P. 2,048,526, 21.7.36. Appl., 12.9.35).—The steel article is embedded in powdered B₄C and heated for several hr. at 1400°. A. R. P.

Inhibiting or retarding acid corrosion of ferrous metals. A. J. SAUKAITIS, Assr. to AMER. CHEM. PAINT CO. (U.S.P. 2,049,517, 4.8.36. Appl., 6.6.34).—HCl pickling solutions for steel consist of 1:1 acid containing CuCO₃ 0.0021, and the reaction product of R·CHO and NH₂R' (e.g., methylene-*o*-toluidine) 0.0083 lb./ (U.S.) gal. A. R. P.

Manufacture of rust-resisting metal-plated wire. C. D. JOHNSON, Assr. to JOHNSON STEEL & WIRE CO., INC. (U.S.P. 2,048,552, 21.7.36. Appl., 19.12.34).—Fe or steel wire is passed continuously through a flux bath, a molten 2:1 Zn-Cd alloy bath, and a molten Sn bath in succession. A. R. P.

Apparatus for ore concentration. S. MALKE, Assr. to A. O. SMITH CORP. (U.S.P. 2,057,338, 13.10.36. Appl., 29.3.35).—A rotary drum is formed of two truncated cones (*A*, *B*) of like but unequal inclination, cone *A* (of lesser angle) forming the larger end of the drum and cone *B* the smaller end. Within *A* and extending out beyond it is a third (cylindrical or tapering) drum *C*, all drums being provided with internal helical blades causing travel in the direction *A* → *B*. The blades decrease in depth in the same direction. The pulp is fed to *A*, light tailings discharging from *C* and heavy concentrate at the small end of *B*. H₂O sprays are provided from an axial pipe. B. M. V.

Ore jigs. PLACER DEVELOPMENT, LTD., and B. R. STORSAND (B.P. 472,727, 23.10.36).—The lower part of the hutch is vibrated, it being connected to the stationary part of the hutch by a Ω -shaped flexible ring. The screen, H₂O supply, and hutch-outlet valve are stationary, the last having a sliding joint with the moving part. B. M. V.

Froth-flotation (A) treatment of [sulphide] ores, (B) [sulphide] ore separation. F. A. BRINKER (U.S.P. 2,048,369—70, 21.7.36. Appl., [A] 29.2.32, [B] 29.3.32).—(A) Complex Fe-Cu-Zn-Pb sulphide ores are wet-ground and the sol. salts (cyanicides) washed out of the pulp; the material is then repulped with H₂O, NaCN and a salt of a metal capable of pptg. Fe(CN)₆⁴⁻ are added, and the pulp is subjected to differential flotation to float successively the Pb, Cu, and Zn sulphides. (B) In the flotation of complex sulphide ores, NaCN and SO₂ are added to inhibit flotation of CuS minerals while the PbS is being removed, and the CuS is then activated by addition of a sol. Pb salt. A. R. P.

Roasting of [sulphide] fines. H. J. CORDY and W. J. BURGOYNE, Assrs. to GEN. CHEM. CO. (U.S.P. 2,047,995, 21.7.36. Appl., 6.7.33. Can., 4.2.31).—The fines, suspended in a small vol. of air, are blown into a large vol. of air which is passed downwards through the combustion chamber while cooling air is

blown up the walls to prevent formation of accretions thereon. A. R. P.

Copper brazing. R. TERRY, Assr. to GEN. MOTORS CORP. (U.S.P. 2,060,959, 17.11.36. Appl., 29.10.34).—A paste of particles of Fe and lacquer or other decomposable material is placed in the joint (which is not capillary), Cu is sprinkled outside, and the temp. raised to melt the Cu, which in this condition is drawn into the voids left by the decomp. of the lacquer, the Fe holding steady the pieces to be joined. B. M. V.

Casting copper and copper alloys. F. F. POLAND, Assr. to AMER. SMELTING & REFINING CO. (U.S.P. 2,050,375, 11.8.36. Appl., 18.10.33. Renewed 23.12.35).—Moulds used for casting O-free Cu are dressed with a paste consisting of a mixture of bone ash or bone black 3 and rosin 1 lb. with 1 (U.S.) gal. of EtOH. A. R. P.

Copper alloy. R. H. HARRINGTON, Assr. to GEN. ELECTRIC CO. (U.S.P. 2,048,549, 21.7.36. Appl., 31.1.35).—The alloy contains Co < 3 (2.6), Al + Be > 1 (Al 0.08, Be 0.32)%. It can be pptn.-hardened by suitable heat-treatment. A. R. P.

Heat-treatment of copper-base alloys. W. C. ELLIS, Assr. to BELL TELEPHONE LABS., INC. (U.S.P. 2,050,601, 11.8.36. Appl., 29.10.30).—Claim is made for an alloy of Cu with about 4% of a silicide of Cr, Fe, Co, or, preferably, Ni, which is heated at 875° for 2 hr., quenched, reheated at 500° for 2 hr., cold-worked, and finally heated at 100—500° for 1—4 hr. A. R. P.

Manufacture of copper-titanium alloys. G. F. COMSTOCK, Assr. to TITANIUM MANUFG. CO. (U.S.P. 2,049,291, 28.7.36. Appl., 18.4.34).—Molten Cu is covered with a flux consisting of CaF₂ 65—80, NaCl + NaF 35—20%, and the Ti is fed through this into the metal bath to prevent it oxidising before alloying. A. R. P.

Copper-nickel-titanium alloys. N. B. PILLING and P. D. MERICA, Assrs. to INTERNAT. NICKEL CO., INC. (U.S.P. 2,048,166, 21.7.36. Appl., 1.10.31. Renewed 17.12.35).—Alloys of Cu with Ni 50—85 and Ti 1—10% are homogenised at >750°, quenched, and reheated at 400—600° to produce pptn.-hardening. A. R. P.

Treating metalliferous compositions of copper, tin, and lead. C. W. HANSON, Assr. to AMER. SMELTING & REFINING CO. (U.S.P. 2,050,319, 11.8.36. Appl., 14.1.35).—Scrap white metal, bronze, brass, or Cu-rich dross is melted and blown with air to volatilise Zn as ZnO and form a Cu₂O dross containing PbO and SnO₂, which is smelted to blister Cu and electrolytically refined. The smelting residues and slimes are resmelted with the metal in the converter to produce "white matte" containing Sn 35, Cu 45, and Pb 15%. This matte is granulated, crushed, and roasted to convert part of the Cu into CuO, which is extracted with H₂SO₄ to give pure aq. CuSO₄ for the electrolytic refining; the residue is further roasted and leached with an excess of H₂SO₄ to obtain an impure acid CuSO₄ solution, which is used in the first leaching operation, and the final Pb-Sn slimes are

reduced to metal or otherwise treated for recovery of Sn and Pb. A. R. P.

Manufacture of fabricated structures [by welding copper alloy]. H. C. JENNISON, Assr. to AMER. BRASS Co. (U.S.P. 2,049,449, 4.8.36. Appl., 21.10.31).—Vessels and pipes for manufacturing purposes etc. are made of an alloy of Cu with Si 0.35—1.0 (3.5) and Mn \geq 3%, the joints being autogenously welded, using a rod of the same composition. A. R. P.

Condensing zinc vapour. E. C. HANDWERK and G. T. MAHLER, Assrs. to NEW JERSEY ZINC Co. (U.S.P. 2,048,863, 28.7.36. Appl., 17.4.33).—The condenser is surmounted by a tall rectangular column containing a series of downwardly inclined and overlapping baffles spaced from one another and projecting alternately through opposite walls. A. R. P.

Zinc-base alloys. W. M. PEIRCE and E. A. ANDERSON, Assrs. to NEW JERSEY ZINC Co. (U.S.P. 2,048,287—9, 21.7.36. Appl., [A] 12.3.29, [B, C] 18.3.29).—Zn alloys capable of being mechanically worked to produce a resistance to cold-flow superior to that of pure Zn contain (A) Cu 0.05—2, Mn 0.1—2, and/or Ni 0.05—1%, (B) Mn and Ni \geq 1%, but $>$ the limiting solid solubility, or (C) Cd 0.05—2, with Ni 0.05—1 and/or Mn 0.1—2%. A. R. P.

[Nickel-base] thermocouple alloy. O. HERMANN (U.S.P. 2,049,443, 4.8.36. Appl., 21.2.35).—The negative wire consists of an alloy of Ni with 8—10% Ti and the positive wire of a Cu—Ni alloy. A. R. P.

Manufacture of brittle metals or alloys [e.g., nickel-iron alloys for dust cores]. W. E. REMMERS, Assr. to WESTERN ELECTRIC Co., INC. (U.S.P. 2,049,927, 4.8.36. Appl., 10.5.34).—The molten Ni—Fe alloy is treated with Fe_2O_3 until a small test casting shows a flat surface and is free from pores; Fe—Mn is then added until the O content is reduced to the desired val., the alloy is cast into flat plates which are reduced to powder, and the powder is used for making sintered dust cores. A. R. P.

Manufacture of stable invar. H. SCOTT, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING Co. (U.S.P. 2,050,387, 11.8.36. Appl., 15.3.34).—Electrolytic Fe and Ni powders are annealed in dry H_2 at 1150° for 20 hr. to remove C, S, and P and the appropriate mixture of the two metals is then melted and allowed to solidify in pure H_2 . A. R. P.

Reclamation of [lead] battery-plate scrap. A. M. THOMSEN, Assr. to THOMSEN CHEM. CORP. (U.S.P. 2,049,633, 4.8.36. Appl., 24.2.33).—The Pb is separated by heating the material in a rotary roaster at $>$ the m.p. of Pb and allowing it to liquate. Powdered coal is added to the oxide residue and the temp. raised to reduce PbO and Sb_2O_3 and to obtain by liquation an Sb—Pb alloy. A. R. P.

Recovery of precious metals [gold] from ore. H. LACKEY, Assr. to W. A. BURTON (U.S.P. 2,049,741, 4.8.36. Appl., 2.9.33).—Claim is made for constructional details of a cascade amalgamating system. A. R. P.

Recovery of precious metals from mattes. E. M. WISE and R. F. VINES, Assrs. to INTERNAT. NICKEL Co., INC. (U.S.P. 2,048,152, 21.7.36. Appl., 17.11.33).—The molten matte is treated with Si, P, or B (Si) added as a high-grade ferro-alloy to cause the Pt metals to separate in the form of a low-grade ferro-alloy. A. R. P.

[Platinum-copper-gold] dental alloy. R. L. COLEMAN and K. SMITH, jun. (U.S.P. 2,050,040, 4.8.36. Appl., 27.9.34).—The alloy consists of Pt and/or Pd 10—40 (Pt 13.2, Pd 11.6), Cu 5—30 (9.4), and Au 30—65 (65%) to which is added 0.25—7.5 (1.5 or 3%) of Sn; heat-treatment comprises quenching from 900° and reheating at 650—700°. A. R. P.

Palladium dental alloy. E. M. WISE, Assr. to INTERNAT. NICKEL Co., INC. (U.S.P. 2,050,077, 4.8.36. Appl., 1.8.34).—The alloy consists of Pd 11—30.6, Cu 7.8—23.7, Au 22.2—54.2%, and Ag the remainder, the Pd : Au ratio being 0.36—0.74 : 1. After quenching from $>$ 900°, the Brinell hardness is 160, rising to 370 on ageing at 400—600°. A. R. P.

(A) Production of hard [gold-silver-palladium] alloys. (B) Manufacture of [silver-palladium] alloy. O. FEUSSNER and A. JEDELE, (A) Assrs. to W. C. HERAEUS GES.M.B.H. (U.S.P. 2,048,647—8, 21.7.36. Appl., [A] 14.7.32, [B] 19.6.34. [A] Ger., 15.7.31, [B] Belg., Fr., Holl., 13.7.32).—(A) An alloy of Pd 60—40, Ag 20—48, Au 8—18, and Fe, Ni, or Co 2—10% is quenched from 700—1000° and aged at 400—700°. (B) The alloy contains Pd 20—50, Ag 72—30, Sn 0.5—10, and Cu or Au 5—10%. In both cases \geq 4% of P may be added to increase the fluidity when the alloys are used for casting dental plates. A. R. P.

(A) Manufacture of alloys. (B) Alloy [for pen points]. C. PFANSTIEHL, Assr. to PFANSTIEHL CHEM. Co. (U.S.P. 2,048,706—7, 28.7.36. Appl., 15.11.34).—(A) An alloy of Co 35—50 (41), Cr 30—40 (35), W 15—25 (20), and C 3—5 (4)% is fused in the arc furnace and allowed to freeze during about 3 sec. The product is broken to the desired size and each particle heated to 200—400° above the m.p. and cooled in about 1 sec. (B) Claim is made for spherules of the above alloy made as directed in (A). A. R. P.

Manufacture of [sintered] hard alloys. R. PINTON, Assr. to GEN. ELECTRIC Co. (U.S.P. 2,049,317, 28.7.36. Appl., 2.5.35. Fr., 4.5.34).—Two sintered aggregates are prepared, consisting of (a) a mixture of WC 92—94 and Co 8—6%, and (b) TiC 88—82 and Ni 12—18%; both are separately finely ground and a mixture of (a) 90—95 and (b) 10—5% is compressed into rods which are sintered as usual. A. R. P.

[Hard chromium-tungsten cutting-tool] alloy. R. T. WIRTH (U.S.P. 2,048,239, 21.7.36. Appl., 14.11.29).—Claim is made for a sintered mixture of Cr 55—60, W 32—36, and C 8.5—9%. A. R. P.

Manufacture of metal bodies consisting of a core and a shell [zirconium-coated molybdenum wire]. K. M. VAN GESSEL and W. D. VAN WIJK, Assrs. to RADIO CORP. OF AMERICA (U.S.P. 2,050,820),

11.8.36. Appl., 23.8.32. Holl., 9.9.31).—A Mo core is wrapped in Zr foil and inserted in a closely fitting Fe shell; the whole is then drawn down to fine wire and the Fe removed by means of acid. A. R. P.

Manufacture of [cast carbide] alloy. W. T. BOYER (U.S.P. 2,050,266, 11.8.36. Appl., 22.4.32. Renewed 12.3.36).—An intimate powder mixture of MoC 5—50, Fe 30—65, and Co 10—30% is melted and treated with a mixture of V (as Fe-V) 0.5—6, Ta (as Fe-Ta) 1—15, and TiC 0.2—10 or Ti (as Fe-Ti) 0.2—25%; when completely fluid the alloy is cast, and the castings are removed from the moulds at 1100° and allowed to cool in air. A. R. P.

Plated metal having carbide surface. C. A. MARLIES and G. E. WHITE, Assrs. to B. S. TESCHNER (U.S.P. 2,048,276, 21.7.36. Appl., 21.4.32).—Claim is made for ferrous alloys plated with Cr or W and then case-hardened to produce a Cr (or W) carbide outer layer. A. R. P.

Treatment [bright annealing or case-hardening] of metal. W. A. DARRAH (U.S.P. 2,049,250, 28.7.36. Appl., 23.3.33).—Claim is made for a combination of combustion chamber, heating chamber with controllable atm., and dampers and flues for regulating the gas and air pressures and the nature of the furnace atm. A. R. P.

Production of [lacquered] wire articles. E. B. DILLON, Assr. to AMER. STEEL & WIRE Co. of NEW JERSEY (U.S.P. 2,061,352, 17.11.36. Appl., 21.5.34).—The wire is annealed, the temp. lowered, and synthetic resin enamel applied at the temp. necessary to produce auto-hardening. The ends, after cutting to form baling wire or the like, are recoated with suitable lacquer. B. M. V.

[Inhibitors for use in] pickling of metal. C. H. MCCOLLAM, D. L. WARRICK, and J. M. GOTSHALL, Assrs. to TIMKEN ROLLER BEARING Co. (U.S.P. 2,050,354—5, 11.8.36. Appl., 3.9.35).—The inhibitor consists of the product obtained by sulphonating (A) an org. OH-compound (PhOH, cresol, or an alcohol) and a mustard oil or substituted thiourea, or (B) a 2 : 1 mol. mixture of creosote and CS(NHPh)₂. A. R. P.

Sealing of metal into quartz. BRIT. THOMSON-HOUSTON Co., LTD., C. GILSON, and J. G. BRETT (B.P. 472,126, 16.3.36).—Moderately thin foil is united to a lead-in wire and to an electrode support or other device fixed within the quartz bulb; before sealing-in, the foil is reduced to a thickness of \approx 0.0006 in. by electrolysis. B. M. V.

Oxide-coating of aluminium. H. K. WORK, Assr. to ALUMINUM Co. OF AMERICA (U.S.P. 2,050,872, 11.8.36. Appl., 6.6.34).—In the anodising of Al in dil. H₂SO₄ and H₂C₂O₄ the metal is supported in the bath by means of an Al clamp having a lower current-absorbing capacity. A. R. P.

Manufacture of a decorative [aluminium-bronze] alloy. C. S. SMITH, Assr. to AMER. BRASS Co. (U.S.P. 2,050,069, 4.8.36. Appl., 12.3.32).—The 11.9% Al-Cu alloy is cold-worked to sheet, which is annealed at 900° to produce a large-grained β -structure, quenched, and reheated at 550° to produce a

lamellar (Widmanstätten) $\alpha + \delta$ -structure. On etching the surface it acts as a diffraction grating. A. R. P.

Electrolytic deposition of metals. J. BILLITER, Assr. to COPPERWELD STEEL Co. (U.S.P. 2,061,554, 24.11.36. Appl., 11.12.30. Renewed 25.2.36).—For the manufacture of tubes a cathode of continuous wire of fusible metal is drawn from a reel at one end of the bath by a winding and twisting device at the other end; the twisting causes rotation of the cathode in the bath, and the deposited metal is subjected to reciprocating polishing. B. M. V.

Electrodeposition of metals. C. S. BROCKMAN (U.S.P. 2,048,594, 21.7.36. Appl., 21.1.35).—Baths for plating with Cu, Ni, Co, Zn, or Cd consist of solutions of the appropriate sulphates with N(C₂H₄·OH)₃ and with or without H₃BO₃. A. R. P.

Electrolytic bath for depositing chromium. C. WICKENHISER (U.S.P. 2,050,478, 11.8.36. Appl., 10.8.35).—A solution of CrO₃ containing 2% (on the CrO₃ content) of a basic Mg, Ni, or Al carbonate is claimed. A. R. P.

[Ferrous] welding rod. J. B. AUSTIN and G. E. DURHAM, Assrs. to UNA WELDING, INC. (U.S.P. 2,048,174, 21.7.36. Appl., 11.6.34).—The rod consists of a low-Cr Fe alloy coated with a mixture of CaF₂ 3.5—6.25, CaCO₃ 5.4—9, SiO₂ 0.9—1.5, rhodochrosite 1.35—2.25, Na₂SiO₃ 2.9—4.9, and Mg 0.18—0.3% of the wt. of the rod. A. R. P.

[Ferrous metal] welding rod. A. G. DE GOLYER, Assr. to VULCAN ALLOY CORP. (U.S.P. 2,050,043, 4.8.36. Appl., 7.4.36).—The rod consists of an alloy of Fe with Cr 9—15 (12.8), Mn 1—4 (2—3), Mo or W 1—4 (Mo 2), B 0.5—2.25 (0.66), C 0.25—0.9 (0.6), and Si 0.15—1.5 (1.15)%. A. R. P.

Welding electrodes. V. MILLER and J. H. HUMBERSTONE, Assrs. to GEN. ELECTRIC Co. (U.S.P. 2,060,681—2, 10.11.36. Appl., [A] 21.3.35, [B] 19.10.35).—(A) A ferrous rod is coated with SiO₂, Fe₂O₃, TiO₂, Fe-Mn, and MgO, with optional addition of Al₂O₃, Na₂O, and K₂O, e.g., with a mixture of feldspar, ilmenite, asbestos, a metallic deoxidiser, and liquid Na silicate. (B) The coat comprises Fe-Mn, SiC, ilmenite, feldspar, talc, and liquid Na silicate; the core Fe contains C 0.13—0.18, Mn 0.40—0.60, P \approx 0.04, S \approx 0.04, Si \approx 0.025%. B. M. V.

[Copper] alloy [for resistance-welding electrodes]. F. R. HENSEL, Assr. to P. R. MALLORY & Co., Inc. (U.S.P. 2,049,500, 4.8.36. Appl., 23.2.35).—The alloy contains Cr 0.1—1.5, Ag 0.03—1, and Cd 0.1—1.25%; it has a conductivity 75—85% that of Cu, a much greater resistance to oxidation and grain growth at high temp., and a Rockwell B hardness of 10 in the quenched state and 60—80 after ageing at 400°. The hardness is retained almost indefinitely at 400°. A. R. P.

Recovery of selenium [from copper-refinery anode mud]. F. F. POLAND, Assr. to AMER. SMELTING & REFINING Co. (U.S.P. 2,048,563, 21.7.36. Appl., 8.3.34).—The mud is leached to remove Cu, washed, dried, and fused with NaOH to which is added just sufficient NaNO₃ to convert the Se into Na₂SeO₃. The product is extracted with H₂O to

leave a residue of precious metals and give a solution from which the Se is recovered by treatment with HCl and SO₂. A. R. P.

Heat-treating furnace. Diffusion impeller deflector. Producing metallic surfaces.—See I. P recovery.—See VII. Glass-metal seal.—See VIII. Switch contact. Electroplating.—See XI.

XI.—ELECTROTECHNICS.

The rectifier, a versatile conversion unit. C. C. LEVY (Trans. Electrochem. Soc., 1937, 72, Preprint 23, 347—358).—Methods of converting a.c. into d.c. are discussed and compared, and information is appended on the applications of the Cu₂O rectifier in the electrochemical and electrometallurgical fields. J. W. C.

Copper oxide rectifiers. L. O. GRONDAHL (Trans. Electrochem. Soc., 1937, 72, Preprint 22, 325—345).—A review, including new data on rectifier characteristics. J. W. C.

Mercury arc rectifiers and ignitrons. J. H. COX and D. E. MARSHALL (Trans. Electrochem. Soc., 1937, 72, Preprint 24, 359—375).—Compared with the older type of Hg arc rectifier, the ignitron having an ignitor of B₆C has increased efficiency and flexibility. Applications in the electrochemical industries are discussed. J. W. C.

Experiments on the silver chloride and silver oxide batteries. K. KINOSHITA (J. Electrochem. Assoc. Japan, 1935, 3, 341—349).—AgCl powder in a porous porcelain cup or in a Ag-wire bag was ineffective as anode in a cell of the type AgCl|HCl|Ag. When coupled with Cd, Mg, or Zn the cell had a small internal resistance, even during the last stage of discharge, owing to formation of finely-divided Ag. Ag₂O powder may be used as a positive electrode for an alkaline storage battery, but diffusion of colloidal Ag₂O must be avoided. CH. ABS. (e)

Manganese dioxide for the dry cell. T. OKADA, K. WATANABE, and N. SAWADA (J. Electrochem. Assoc. Japan, 1935, 3, 248—250).—The potentials of three samples of MnO₂ against the saturated Hg₂Cl₂ electrode showed abrupt breaks at approx. p_H 1, were almost const. at p_H 2—6.5, and showed fluctuations like those of the O electrode in the alkaline range. MnO₂ displays a buffer action. CH. ABS. (e)

Self-discharge of the dry cell. I. Self-discharge of the negative and positive electrodes. S. MAKINO and Y. SATAKE (J. Electrochem. Assoc. Japan, 1935, 3, 243—247; cf. B., 1936, 554).—MnO₂ causes self-discharge during shelf life. CH. ABS. (e)

Influence of temperature of formation on initial capacity and life of pasted S.L.I. storage-battery plates. J. E. HATFIELD and O. W. BROWN (Trans. Electrochem. Soc., 1937, 72, Preprint 21, 301—324).—“Forming” positive plates at -7° decreases the life but increases their initial capacity, whereas the use of negative plates formed at -7° in cells having positive plates formed at 90° increases the life of the latter and has little effect on initial capacity. In the temp. range -7° to 38°, lowering the formation temp. shortens the life of the battery but

increases the initial capacity under normal rates of discharge. J. W. C.

Capacity increase of pasted positives of the lead storage battery due to carbon powder mixed in with the active material. T. TIKU (J. Electrochem. Assoc. Japan, 1935, 3, 400—406).—Addition of 0.5—1.0% of C to the PbO₂ decreased the capacity. With >1% C there was an increase. With 7.5% C the increase in capacity per g. of active material was \propto its C powder content. CH. ABS. (e)

Electrolytic reduction of ferric sulphate in presence of titanium sulphate. II. K. J. GRATSCHEV and S. I. REMPEL (J. Appl. Chem. Russ., 1937, 10, 1355—1363; cf. A., 1937, I, 419).—Optimum conditions for reduction of Fe₂(SO₄)₃ to FeSO₄ in presence of Ti^{IV} and H₂SO₄ are: c.d. 3—4 amp./sq. cm., at 2.74—3.1 v. and at 50° with an asbestos, and at 60° with a porcelain, diaphragm. The anolyte consists of 45—50% H₂SO₄. R. T.

Determination of ice-water relationships by measurement of dielectric constant changes. L. T. ALEXANDER and T. M. SHAW (J. Physical Chem., 1937, 41, 955—960).—The proportion of H₂O present as ice in a given substance is determined by making the substance part of the dielectric of a condenser which is in parallel with a variable condenser in a resonating circuit (18 × 10⁵ cycles). The use of the method is illustrated by curves showing the freezing of sugar solution, soils, potato tuber, leaves, and peas. F. L. U.

Determination of the p_H of nickel solutions with chemically-treated paper strips. T. H. CHAMBERLAIN (Metal Ind., N.Y., 1937, 35, 279—280).—Comparisons with the calomel quinhydrone cell and with the coloured disc-type comparator show that the p_H of Ni solutions can be satisfactorily determined by means of test-papers over the range 5.2—6.8. L. S. T.

Spectral analytical methods for industrial laboratories. R. RAMB (Metallwirts., 1937, 16, 1102—1107).—Different methods available are discussed with reference to the determination of Al and Si in steel, and of metals in cellulose and rubber, and the qualitative examination of Fe sheet, Pb₃O₄ steels, and substances containing rare-earth elements. C. E. H.

Cauldrons for tar etc. Testing Diesel fuels.—See II. Moisture adsorption in fibrous insulation.—See V. Control in Br production.—See VII. High-frequency insulators.—See VIII. Steel furnaces. Determining Mn and Cr in steels. Heating steel for forging etc. Ni in magnetic alloys. High- μ alloys. Physical chemistry in metallurgy. Conductivity of Al wires. Welding. Metal rectifiers. Plating metals in colours. Plating Cu, Ni, Cu-Ni-Zn, Co-Ni, Ag-Cd. Cyanide baths. Theory of Cr-plating. Cracking of Cr-plate. Measuring thickness of Sn coatings. Stripping metal deposits. Al-plated metals. Anodic oxidation of Al.—See X. p_H determination.—See XVII. p_H of milk-of-MgO.—See XX.

See also A., I, 625, Electrolytic prep. of D_2O . Electrolytic separation of W. Electrocrystallisation of metals. 629, Prep. of F. II, 482, Electrolytic reduction of glycollic and lactic acids. 483, Synthesis of higher dicarboxylic acids.

PATENTS.

Electric furnace. A. E. RHOADS, Assr. to DETROIT ELECTRIC FURNACE Co. (U.S.P. 2,061,090, 17.11.36. Appl., 16.11.33).—A furnace, preferably of the partly rotating-barrel type, is provided with a no. of detachable unitary structures (one for each phase), each containing a pair of electrodes and feeding means. B. M. V.

Rotating electric furnace. P. ROSENFELDT (U.S.P. 2,061,741, 24.11.36. Appl., 20.2.33).—The main part of a rotary, inclined, cylindrical furnace is provided with a helical lining which tends to retard the travel of material and is in step form with the long faces of the steps horizontal while at the bottom of the drum. A discharge extension of smaller diameter is provided with a helix of opposite hand. Metallic heating units are embedded in the lining. B. M. V.

Electric heater. P. A. CLAPP, Assr. to R. G. RYE and I. G. GOLDSTEIN (U.S.P. 2,060,039, 10.11.36. Appl., 20.1.36).—In a heater for liquids, the liquid itself forms the secondary winding of a transformer or induction heater, it being circulated through a coiled non-conducting pipe. When the liquid boils, the vapour affects a thermo- or pressure-sensitive regulator for the primary current, and if evaporation is continued to such an extent as to cause an abnormally low liquid level the secondary circuit is thereby opened. B. M. V.

Electrical condenser. E. A. WEAVER, Assr. to RAYTHEON MANUF. Co. (U.S.P. 2,049,553, 4.8.36. Appl., 24.11.26. Renewed 25.11.30).—The electrodes consist of an alloy of Fe with Cr 16 and Si 1% coated with flake graphite and immersed in a solution of K_2CO_3 or an alkali borate. A. R. P.

Electrolytic condensers. BRIT. INSULATED CABLES, LTD., and J. C. QUAYLE (B.P. 472,069, 29.5.36).—A metallic core (on which the condenser is wound) and a metallic container are joined together in good electrical contact, *e.g.*, by spot-welding. B. M. V.

Electrolytic condensers. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 472,097, 23.10.36. Ger., 26.10.35).—In a wet condenser for potentials >350 v. the electrodes comprise discs with deep upstanding and hanging rings, respectively, having narrow saw cuts at intervals, the vent being through the upper disc. B. M. V.

Electrolytic condenser. J. B. BRENNAN (U.S.P. 2,060,022, 10.11.36. Appl., 18.1.34).—An Al container acting as cathode for an electrolytic condenser is internally sprayed with corrosion-resisting metal, *e.g.*, Cu. B. M. V.

Electrical accumulators. W. W. GROVES, From DEUTS. CELLULOID-FABR. (B.P. 473,194, 4.4.36).—Corrugated separators are formed from a polymerisation product wholly or mainly of vinyl chloride. B. M. V.

Gaseous conduction device. D. S. STEVENS (U.S.P. 2,061,390, 17.11.36. Appl., 8.4.33).—An electrode for high currents comprises a metal cup containing K_2CrO_4 , the bulb being evacuated after heating the salt to its decomp. point. B. M. V.

Insulated electrical conductors. S. RUBEN, Assr. to VEGA MANUF. CORP. (U.S.P. 2,059,280, 3.11.36. Appl., 14.1.30).—To form insulation which will resist high temp., a ground mixture of Al oxide and halide is applied to the conductor and heated to the decomp. point of the halide. B. M. V.

Insulated electrical conductor. J. M. DE BELL, Assr. to HERCULES POWDER Co. (U.S.P. 2,060,856, 17.11.36. Appl., 20.4.35).—Extracted pine-wood pitch (obtained by extracting the wood, and comprising oxidised resin acids and terpenes, polyphenols, and polymerised terpenes) is the sole or main constituent of the insulation; $>10\%$ of castor oil may be added. B. M. V.

High [electrical] resistance [insulator] material. L. McCULLOCH, Assr. to WESTINGHOUSE ELECTRIC & MANUF. Co. (U.S.P. 2,050,357, 11.8.36. Appl., 28.12.33).—Pinewood is heated at 600° in an inert atm. until all volatile matter is expelled, the charcoal is ground and baked at 500 – 600° for 18 hr. to obtain const. resistivity, and the powder mixed with a drying oil, varnish, or resin to produce a coating for impregnating insulating tapes. A. R. P.

(A) Resistance element. (B) Manufacture of resistance elements. N. C. SCHELLENGER, Assr. to CHICAGO TELEPHONE SUPPLY Co. (U.S.P. 2,061,106–7, 17.11.36. Appl., [A] 17.4.33, [B] 2.11.34).—A C rheostat of the sliding-contact type is manufactured by spraying on to an insulating base a succession of coatings of C in a binder, each coat being shorter than the one before and having a tapering edge. (B) The layers also differ in ρ . B. M. V.

Electrical insulation material. F. J. GROTEN, Assr. to GEN. ELECTRIC Co. (U.S.P. 2,049,370, 28.7.36. Appl., 30.6.34).—An arc-resistant insulator material is made by impregnating asbestos board with a 2:1 mixture of carnauba wax and paraffin wax at 150° . A. R. P.

Manufacture of dry [selenium] rectifiers, photoelectric cells, elements for thermoelectric couples, and the like. H. RUPP (B.P. 472,961, 30.3.36).—Free halogen, *e.g.*, I, or an org. halogen compound $=0.1$ or 1 – 5% of I is added to the Se; at least one face of the counter-electrode is of fusible metal and is melted in contact with the Se. B. M. V.

Electric potentiometers. STEATIT-MAGNESIA A.-G. (B.P. 473,086, 5.5.36. Ger., 7.6.35).—A resistance composed of particles of conducting material and (insulating) binder is shaped as an arc over which the contact slides, and with straight extensions forming the non-adjustable parts of the resistance. B. M. V.

Electrical switch contact. L. ZICKRICK, Assr. to GEN. ELECTRIC Co. (U.S.P. 2,057,604, 13.10.36. Appl., 19.9.35).—Claim is made for a sintered mass of Ag with 0.5–20 (1–3)% of Pb oxide. Presence of Ti oxide, W, and/or Mo is optional. B. M. V.

Electrolytic condensers and the like. MALLORY PATENTS HOLDING CO., LTD. From P. R. MALLORY & Co., INC. (B.P. 468,270, 2.5.36).—The electrolyte of a condenser comprises a reaction product formed by heating a varnish-base material, *e.g.*, shellac, α -(C_6H_4CO)₂O resin base, casein, tung oil, etc., with an alkali, *e.g.*, Na_2CO_3 , KOH, borax, NH_3 , etc., and a plasticiser, *e.g.*, $(CH_2OH)_2$, glycerin. Alternatively, $N(C_2H_4OH)_3$ may be used as alkali and plasticiser. J. S. G. T.

Electrolytic [condenser] devices. P. ROBINSON, Assr. to SPRAGUE SPECIALTIES Co. (U.S.P. 2,057,314—5, 13.10.36. Appl., [A] 1.7.31, [B] 25.8.34. Renewed [A] 23.11.35).—(A) A film-forming Al electrode is separated from the other electrode by a narrow-meshed, crinoline spacer containing semi-fluid electrolyte, comprising H_2O 30—10% and a boric ester of glycerin 70—90%. A method of forming the film with an initial p.d. of 500 v. is described. (B) Film-forming is effected by an immediately applied max. voltage and high c.d., the latter being attained by dipping the electrode or bundle of electrodes gradually into a bath of electrolyte, substantially all the forming current passing at or near the surface of the bath. B. M. V.

(A) **Electrolytic device.** (B) **Composition for and method of electroplating.** F. R. RAPIDS (U.S.P. 2,061,591—2, 24.11.36. Appl., [A, B] 21.3.35).—(A) A bristle brush has a metallic ferrule surrounding the fixed end of the bristles and connected through a grip switch to a supply of current. (B) Aq. solutions of salts of Ni or other metal to be deposited are made viscous by presence of starch or other org. matter and are plated by means of the brush electrode described in (A). B. M. V.

Devices for equalising and regulating pressure in electrolytic decomposing apparatus operating under pressure. SIEMENS & HALSKE A.-G. (B.P. 473,103, 19.8.36. Ger., 24.8.35).—The outlet of gas from individual receivers is controlled by floating bells the interior of which are subjected to a common gas pressure, selected to be that desired in the outlet gases. The floats cut off the gas outlet by rising. B. M. V.

Apparatus for magnetic separation of materials. F. KRUPP GRUSONWERK A.-G. (B.P. 472,758, 24.3.36. Ger., 17.4.35).—A conveyor band passes over two rollers both of which are magnetised. The material is fed to the rising side of the first roller and all the magnetic particles with some adhering gangue are carried up; on the horizontal run between rollers the layer is subjected to vibration, and on the downward face of the second roller the gangue drops off while the magnetic particles are carried further around and preferably washed off at a point where the belt enters a re-entrant curve. B. M. V.

Electrical washer for [petroleum] emulsions. H. F. FISHER, Assr. to PETROLEUM RECTIFYING Co. OF CALIFORNIA (U.S.P. 2,050,301, 11.8.36. Appl., 25.10.26. Renewed 10.9.32).—The petroleum is passed through a vessel in which it is subjected to an electrostatic discharge while an electrolyte is sprayed into the oil as a fine emulsion, coagulation of which

by the discharge removes C, silt, and other suspended matter from the oil. A. R. P.

Electric treating system for emulsions. L. C. WATERMAN, Assr. to PETROLEUM RECTIFYING Co. OF CALIFORNIA (U.S.P. 2,060,839, 17.11.36. Appl., 27.11.34).—Two live electrodes are provided, the earthed vessel being connected to the centre of the high-tension transformer winding. One electrode comprises a cylindrical cage or the like, the other being axially inside it and formed as a stem with a mushroom head on which a high-speed jet of the feed emulsion impinges and causes vibration of the stem, thus enlarging the effective zone of the alternating electric field. B. M. V.

Apparatus for testing acidity. A. O. BECKMAN and H. E. FRACKER, Assrs. to NAT. TECHNICAL LABS. (U.S.P. 2,058,761, 27.10.36. Appl., 12.10.34).—A potentiometer for measuring p_H (the test circuit being of very high resistance) includes a vac. valve, dry cells, and robust milliammeter instead of a fragile galvanometer. B. M. V.

Means for ageing liquors. J. O. and C. F. COFFMAN (U.S.P. 2,061,960, 4.11.36. Appl., 16.2.35).—A.c. is converted by a transformer with simple vibrating contact into a low-tension pulsating current which is applied to the liquor, one electrode being of coiled soft Fe wire having large exposed surface. B. M. V.

Mechanism for measuring colour change. C. E. TARVIN and W. G. DODGE, Assrs. to NEWS SYNDICATE Co., INC. (U.S.P. 2,060,957, 17.11.36. Appl., 25.1.34).—Relating to apparatus for measuring the absorbing power of liquid colouring medium by porous materials (*e.g.*, paper for ink etc.), the claims, while mentioning photoelectric scanning, relate to mechanism for presenting the sample to the bath of colouring liquid. B. M. V.

Apparatus for electrical precipitation [from gases]. H. B. RÜDER and H. FIESEL, Assrs. to INTERNAT. PRECIPITATION Co. (U.S.P. 2,061,045, 17.11.36. Appl., 2.5.36. Ger., 26.4.35).—The gases are passed through a no. of precipitators in vertical series, the pptd. material from each section being led away separately by channels at the bottoms of the upper ranks of collecting electrodes, the lowest compartment serving also as a grit settler. B. M. V.

Controlling the ionic content of air. C. P. YAGLOU, Assr. to H. SEID (U.S.P. 2,060,842, 17.11.36. Appl., 21.1.32).—In an apparatus similar to that described in B.P. 436,437 (B., 1936, 37), the preponderance of ions of desired polarity is determined by varying the frequency, the proportion of negative ions increasing with the frequency. B. M. V.

Electric air-conditioning machines. W. DAWSON and A. JACKSON (B.P. 473,144, 6.4.36).—Apparatus including a fan and sticky material is described. B. M. V.

Electric-discharge devices. BRIT. THOMSON-HOUSTON Co., LTD., L. J. DAVIES, and J. A. V. FAIRBROTHER (B.P. 473,332, 6.4.36).—A vapour lamp operating with high pressure in the internal bulb is

protected by an outer bulb containing a vaporisable substance which generates a counter-pressure. [Stat. ref.] B. M. V.

Electric-discharge device and electrode therefor. S. RUBEN (U.S.P. 2,048,567, 21.7.36. Appl., 27.7.34).—The electrode consists of rods of CaSi_2 coated with a Sr, Ba, Ca, Cs, Rb, Na, or K compound (BaCO_3) which is reduced to metal by evacuating the bulb and heating the electrode. A. R. P.

Electric-discharge lamp. L. BURNS, Assr. to HYGRADE SYLVANIA CORP. (U.S.P. 2,061,892, 24.11.36. Appl., 20.12.34).—The bulb of a Hg-vapour arc lamp is of borosilicate glass containing a small proportion of FeO and Sn to increase the absorption of infra-red and ultra-violet rays. B. M. V.

Electric-discharge lamps comprising luminescent materials. GEN. ELECTRIC CO., LTD., A. H. McKEAG, and J. T. RANDALL (B.P. 472,769, 27.4.36).— CaWO_4 with Pb as an activating impurity is coated on to the interior surface of an envelope filled with Ne at a few mm. pressure, or with Hg at a high operating pressure, and is excited to luminescence by the lower energy radiation. [Stat. ref.] B. M. V.

[Opal glass for] luminous [electric-]discharge lamp. H. P. HOOD, Assr. to CORNING GLASS WORKS (U.S.P. 2,059,640, 3.11.36. Appl., 8.1.36).—An opal glass which is unchanged on repeated heating and cooling and becomes fluorescent in presence of Sn^{II} contains a max. of 0.02% of Fe_2O_3 together with (a) CaF_2 and (b) a compound selected from Na_3AlF_6 , Na_2SiF_6 , KF , and/or AlF_3 , the ratio a : b being 1—3 : 1. B. M. V.

Gas- or vapour-filled electric-discharge tubes. F. J. CLEVELAND. From N. S. OERENSÖFI (B.P. 472,648—9, 26.3.36).—(A) A hot cathode is composed of perforated W partly coated with ZrO_2 75, Y_2O_3 15, BaO 8.5, SrO 1.5%, or with ZrO_2 75, Er_2O_3 17.5, ThO_2 6.5, CeO_2 1%. (B) A steadying cage for the arc, and other physical parts, are described. B. M. V.

Indirectly-heated cathode for [electric-]discharge tubes. K. M. VAN GESSEL, G. HOLST, and J. L. H. JONKER, Assrs. to RADIO CORP. OF AMERICA (U.S.P. 2,057,124, 13.10.36. Appl., 2.5.34. Holl., 13.7.33).—The device includes an electron-emitting, tubular member of Cu, Ag, or other metal having a lower heat-radiating capacity than Ni, this property being increased on the inner surface by a layer of V_2O_5 . B. M. V.

Electron-emission device. H. S. COOPER, Assr. to UNION CARBIDE & CARBON CORP. (U.S.P. 2,061,755, 24.11.36. Appl., 18.3.31).—Powdered pure Co is compressed and heated (repeatedly swaged) to form a briquette, the particles being superficially fused, and is afterwards used to manufacture interior parts of an electron-emission device that may be subjected to temp. approx. 900° . B. M. V.

Method of forming [electron-emission] electrodes. W. W. EITEL and J. McCULLOUGH, Assrs. to HEINTZ & KAUFMAN, LTD. (U.S.P. 2,061,759, 24.11.36. Appl., 7.11.33).—Ta is annealed, formed to shape, degassed in the tube, and the heating repeated in presence of H_2 to effect hardening. B. M. V.

Preparation of emissive coating for [thermionic] cathodes. S. HAMADA and K. NOMURA, Assrs. to GEN. ELECTRIC Co. (U.S.P. 2,049,372, 28.7.36. Appl., 10.9.35. Jap., 19.11.34).—The cathode surface is coated with a mixture of an alkaline-earth carbonate and a little NiCO_3 and the mixture is heated in a reducing atm. to convert the NiCO_3 into Ni. A. R. P.

Manufacture of thoriated filament devices. R. R. HOFFMAN, Assr. to HYGRADE SYLVANIA CORP. (U.S.P. 2,057,098, 13.10.36. Appl., 4.1.36).—An automatic device for admitting a reducing ("carbonising") gas into a bulb up to a predetermined pressure and to heat a thoriated filament to produce a proportion of Th metal is described. B. M. V.

Photoelectric device. J. H. DE BOER, W. C. VAN GEEL, and M. C. TEVES, Assrs. to RADIO CORP. OF AMERICA (U.S.P. 2,060,977, 17.11.36. Appl., 28.10.31. Holl., 28.10.30).—A worked glass plate is provided with transparent layers of (1) Ag connected to the positive pole of a battery, (2) a fluorescent Zn salt, (3) semi-conducting BaO, (4) Ba connected to the negative of the battery and forming the sensitive layer nearest the receiving lens. B. M. V.

Manufacture of glow lamps. T. W. CASE, Assr. to CASE RES. LAB., INC. (U.S.P. 2,057,183, 13.10.36. Appl., 27.7.29).—A glow lamp in which the light follows faithfully the change of current is composed of an emitting surface coated with CaO and another alkaline-earth oxide in an atm. of He 95 and N_2 5%; a method of activation is described. B. M. V.

Electric lamp. E. BRODY and T. MILLNER, Assrs. to GEN. ELECTRIC Co. (U.S.P. 2,060,657, 10.11.36. Appl., 12.11.30. Hung., 16.12.29).—An incandescence W filament in an atm. of Kr, Xe, A, and N_2 is claimed. B. M. V.

Irradiating apparatus. R. O. HENSZEY, Assr. to CARNATION Co. (U.S.P. 2,060,865, 17.11.36. Appl., 10.2.34).—Arrangements are described for producing uniform sheets of milk (or other fluid) on either side of the radiating lamps which are also arranged in a plane. Means are provided to prevent semi-stagnation at the edges of the sheets of liquid. B. M. V.

[Supports for resistor windings of] electric furnaces and ovens. F. S. GROGAN (B.P. 468,193, 22.12.36).

Electric welding. BRIT. THOMSON-HOUSTON Co., LTD. (B.P. 468,130, 18.2.37. Ger., 21.2.36. Addn. to B.P. 417,692).

Electrodes for [starting] electric-discharge devices. BRIT. THOMSON-HOUSTON Co., LTD., and H. DE B. KNIGHT (B.P. 473,606, 15.4.36).

[Secondary-emission] photoelectric cells. GEN. ELECTRIC Co., LTD., and C. H. SIMS (B.P. 468,146, 4.3.36).

Automatic control of temp.—See I. Gas calorimeter. Gas analysis. Dewaxing oil.—See II. Treating Si-Fe. Treating Cu-Sn-Pb compositions. Dust cores. Pb from battery-plate scrap. Metal-quartz seals. Oxide-coating Al.

Electrodepositing metals. Welding. Se from Cu-refinery anode mud.—See X.

XII.—FATS; OILS; WAXES.

Colza seeds as a source of fats. A. PROCHOROV (Maslob. Shir. Delo, 1937, No. 4, 41—43).—The oil, after refining and hardening, is suitable for prep. of soap or margarine. R. T.

Causes of rancidity of fats. A. ZINOVIEV and Z. KOLODESHNAJA (Maslob. Shir. Delo, 1937, No. 4, 22—23).—Rancidity is due to both hydrolytic and oxidative processes. R. T.

Consistent fats [lubricating greases]. G. RITTER (Chem.-Ztg., 1937, 61, 908—910).—The composition and characteristic (practical) properties of the various types of greases are described. E. L.

The Twitchell separation [of fatty acids]. R. C. STILLMAN and J. T. R. ANDREWS (Oil and Soap, 1937, 14, 257—260).—The Twitchell, Cocks—Christian—Harding, and Baughman—Jamieson methods for the quant. separation of liquid and solid fatty acids have been critically examined. None of the methods gives an entirely reliable result, particularly when isooleic acids are present. The most important factors influencing the pptn. of Pb isooleate from alcoholic solution are: neutralisation of the fatty acids, presence of KOAc, and accurate control of temp. at 15°. T. G. G.

Glassy state of soaps in commercial products. B. TIUTIUNNIKOV, Z. PLESCHKOVA, and A. TSCHERNITSCHKINA (Maslob. Shir. Delo, 1937, No. 3, 18—22; No. 4, 35—37).—“Glycerin soap” differs from ordinary soap in being in the supercooled, glassy state. Supercooling is possible when castor oil or colophony is included in the soap stock, and a certain optimum crystallisation temp. exists for each type of soap. The causes of formation of opaque spots in transparent soaps are discussed. R. T.

Washing action of soap. S. H. BERTRAM (Chem. Weekblad, 1937, 34, 707—708).—The purifying action of soap depends on its γ against air, the interfacial tension against the fabric and against the various kinds of dirt, the frothing power, and the stability of the froth. It has proved practically impossible to devise washing tests which are generally applicable, but useful data can be obtained by measuring the decrease in γ of H₂O by addition of various amounts of soap, the frothing power and the stability of the froth at different temp., the wetting power for fabrics, and the lowering of the interfacial tension of H₂O against a large no. of substances (drop no.). It is considered that this last method is not sufficiently used in practice. S. C.

Rapid determination of combined oleic acid in soap stock. V. GRUZDEV and B. ZALTZMAN (Prom. Org. Chim., 1937, 4, 38).—25 ml. of soap solution are titrated with 0.1N-Ba(NO₃)₂, taking as the end-point the moment when the foam formed during shaking leaves a film of Ba oleate on the surface of the liquid; the oleate content is given by 1.128A, where A is the vol. (c.c.) of Ba(NO₃)₂ used. R. T.

Fine filtration and vacuum protect olive oil in storage. L. A. PELTON (Food Ind., 1936, 8, 65—66).—Careful filtration and storage of the oil in tanks under a 26-in. vac. protect it from deterioration. CH. ABS. (e)

Component glycerides of olive and tea-seed oils. T. P. HILDITCH and H. M. THOMPSON (J.S.C.I., 1937, 56, 434—438T).—The specimen of Palestine olive oil, the unsaponifiable matter of which was studied by Thorbjarnarson and Drummond (B., 1935, 276), contained the following component fatty acids (wt.-%): palmitic (10.7), stearic (3.6), oleic (76.4), linoleic (9.2). It resembles closely the majority of olive oils from other sources in the composition of its fatty acids. The cause of the discrepancy observed in earlier work on the tri-C₁₈ glyceride content of olive and tea-seed oils [determined as tristearin (I) in the completely-hydrogenated fats] has been investigated. The method employed gives low results with mixtures of saturated triglycerides containing about 50—70% of (I), but for mixtures containing <40% or >75% of (I) it is satisfactory. The determination of tri-C₁₈ glyceride content by examination of the mixed saturated-unsaturated glycerides of an oil partly hydrogenated to a suitable stage or stages gives results consistent with the limits set by the fatty acid composition. The results obtained by this procedure for the olive and tea-seed oils show that the latter follow the usual rule, *i.e.*, the amounts of simple tri-unsaturated C₁₈ glycerides are close to the min. This method is, however, more laborious even than the determination of (I) in a completely-hydrogenated fat. Distillation of the unsaturated esters from olive and tea-seed oils through an electrically-heated fractionation column, and also study of appropriate fractions of the unsaturated esters by means of oxidation or hydrogenation, have shown that hexadecenoic acid is present in small proportions (>1% of the total fatty acids of the oils).

Mechanical processing of vegetable oils. W. W. MOSS (Trans. Amer. Soc. Mech. Eng., 1937, 59, 715—719).—The technique employed for extracting vegetable oils from seeds and for bleaching and deodorising the oils is described. R. B. C.

Expression of vegetable oils. II. Soya-bean oil. E. C. KOO (J. Chem. Eng. China, 1937, 4, 207—211; cf. B., 1937, 696).—The yield of oil from soya bean (oil 17.65, H₂O 10%) is given by $W^2 = 0.00623P^{\frac{2}{3}}/\sqrt{(u/\rho)}$, where the units are as already described (cf. *loc. cit.*); the rate of pressing ($dW/d\theta = 0.00104P/W\sqrt{(u/\rho)}^{\frac{2}{3}}$). E. H. S.

Extraction of lecithin from soya-bean oil residues. E. SALMOIRAGHI (Annali Chim. Appl., 1937, 27, 332—337).—Optimum purity and yield are obtained by extraction with COMe₂ (which removes H₂O, waxes, and phosphatides with P : N ratio other than 1 : 1) and extraction of the residue with MeOH, this extract being pptd. with COMe₂. The application of the process is exemplified by analytical data of residues of German and Italian origin. F. O. H.

Seed oil of the hackberry. H. A. SCHUETTE and R. G. ZEHPFENNIG (Oil and Soap, 1937, 14,

269—270).—The yellow seed oil extracted by light petroleum from the hackberry (*Celtis occidentalis*) had d_{25}^{25} 0.9204, n_D^{25} 1.4794, I val. (Wijs) 150.0, SCN val. 81.97, sap. val. 191.1, Reichert—Meissl val. 0.0, Polenske val. 0.3, OH no. 4.9, sol. acids (% PrCO_2H) 0.08, insol. acids (% corr.) 91.97, unsaponifiable matter 1.35%. The component acids are stearic 4.9, oleic 16.5, and linoleic 70.4%. Thus, although the hackberry belongs to the same genera as the elm (*Ulmus americana*) (cf. B., 1936, 749) the composition of its seed oil is entirely different. T. G. G.

Chemical constitution of oils from superior and inferior flaxseeds. R. A. GROSS and C. H. BAILEY (Oil and Soap, 1937, 14, 260—263).—The compositions and quantities of oils obtained from Abyssinian Yellow and Bison varieties of flaxseeds grown in various localities in Minnesota have been compared. The oils from the former variety always contained a higher % of linolenic acid and a lower % of oleic acid than those from the latter variety. The compositions of the oils varied with the district where the seeds were grown, but the oil contents of the various seeds were fairly const. The I val. of an oil appeared to be a varietal characteristic. T. G. G.

Use of certain esters of unsaturated acids as substitutes for tung oil. A. DRINBERG (Prom. Org. Chim., 1937, 4, 114—117).—The pentaerythryl ester of linseed oil fatty acids, or of the highly unsaturated acids of Japanese sardine oil, may be used as substitutes for tung oil. R. T.

Suitability of vegetable oils for production of lubricants of good consistency. E. GALLE and W. FRIEDL (Petroleum, 1937, 33, No. 44, 9—11).—Experiments are described which are held to prove that rape, soya-bean, and castor oils must be excluded from mixtures if greases of good consistency are required. H. C. R.

Edible oil deodorising equipment and methods. A. P. LEE and W. G. KING, jun. (Oil and Soap, 1937, 14, 263—269).—The earlier methods used in various countries for deodorising oils are outlined. Treatment of the oil with superheated steam *in vacuo* is the only method now used. Various types of modern plant are described. T. G. G.

Colorimetric reactions of fatty oils. H. HELLER (Angew. Chem., 1937, 50, 752—753).—Colour reactions of fatty oils with Ac_2O may be caused by certain constituents other than the unsaponifiable material. Jesser and Thomae's claim (B., 1937, 59) that 10% of soya-bean oil in poppy-seed oil can be detected colorimetrically is disputed. Tables give the colour reactions of various fatty oils with Ac_2O and AsCl_3 , according to Heller and to Jesser and Thomae. A reply from the latter is appended. C. C.

Production of oils from fish livers of low oil content. II. Modified digestion process. H. N. BROCKLESBY and K. GREEN (Biol. Bd. Canada Progr. Repts., 1937, No. 33, 7).—The wash liquors after centrifugation of the digested livers are re-extracted with an edible (e.g., cod-liver) oil to recover vitamin dissolved in emulsified oil. E. C. S.

Distribution of vitamin-A and -D in some organs of British Columbia herring, pilchard,

grayfish, and halibut. L. I. PUGSLEY (Biol. Bd. Canada Progr. Repts., 1937, No. 33, 8—10).—The -A content of the body-oil of the pilchard, herring, and grayfish is low compared with that of the liver oil, but oil from the viscera of halibut was richer in -A than the liver oil. The -A of the viscera is best extracted with another fish oil of low -A content. E. C. S.

Mol. distillation [of cod-liver oil].—See I. Cutting fluids. Lubricants. Greases.—See II. Cu-Ni catalyst.—See VII. Linseed stand oil. Boiled oils, oil substitutes, etc. Rust-preventive paints.—See XIII. Detecting hydrogenated fats in ghee.—See XIX. [Oil from] *Kigelia aethiopica*, Decne. Tunny oil.—See XX.

See also A., II, 482, Unsaturated lower fatty acids (cryst. derivatives). Partial hydrogenation of fish oil. 483, Prep. of ketones from fatty acids of sardine etc. oils. III, 493—8, Vitamins. 503, Wax from sandal leaves. Fatty acids of phosphatides of soya bean and rape seeds. Unsaponifiable matter of algal fats.

PATENTS.

Production of fatty acids with a high degree of saturation from oils and fats. H. KAUFMANN (B.P. 468,170, 15.10.36).—The oil is heated and (a) hydrogenated with a Ni catalyst, or (b) hydrolysed with H_2O , under pressure up to a certain stage, after which both operations are continued simultaneously, by introducing H_2O in the case of (a), or Ni and H_2 if the sequence (b) is adopted; the latter is especially suitable for use with aged or polymerised oils. E. L.

Fatty acid distillation. R. H. POTTS and J. E. MCKEE, Assrs. to ARMOUR & Co. (U.S.P. 2,054,096, 15.9.36. Appl., 24.4.33).—In a continuous process, acid oil (from refinery foots) is deodorised and heated under slight pressure in a pipe still sufficiently to cause evaporation as the material is passed into a low-pressure flash chamber, whence the vapours generated are taken through mist extractors to a fractionating column of the bubble-tray type, in order to separate the individual acids of different b.p. Part of the most volatile distillate is returned as reflux liquid, and steam is introduced as stripping fluid into the lower part of the column and flash chamber. The neutral oil in the non-volatile residuum from the flash chamber may be saponified (Twitchell process) and the crude acids treated as above. E. L.

Manufacture of bar soap. W. A. HUTTON (U.S.P. 2,057,192, 13.10.36. Appl., 2.2.33).—Molten soap is drawn from a kettle by a low-pressure pump to the suction pipe of which any Na_2CO_3 , perfume, or other addendum is injected; the treated soap is then forced by another pump through a "saponifying valve" (final mixing device) into cooling, extrusion, and cutting means. B. M. V.

Manufacture of detergent. A. L. SODERGREEN, Assr. to H. D. PEASE (U.S.P. 2,049,476, 4.8.36. Appl., 12.9.33).—Cereals etc. are heated with H_2O (e.g., at 120° and corresponding pressure until slightly darkened) in order to depolymerise the

proteins and hydrolyse the starches, and the products are alkalisied by further heating with powdered anhyd. NaOH, after which the liberated vapours (NH₃ etc.) are exhausted and CO₂ is admitted to neutralise any free NaOH. E. L.

Refining of vegetable oils. E. M. JAMES, Assr. to SHARPLES SPECIALTY CO. (U.S.P. 2,050,844, 11.8.36. Appl., 7.3.33).—In a continuous process, the oil is mixed with alkali (for >5 min.), warmed to facilitate the subsequent separation of the soap stock (within 2 min.) by centrifugal means, and the deacidified oil washed by intimate mixing with 15% of H₂O, separated centrifugally, and dried in a continuous vac. dryer. E. L.

Treatment [stabilisation to cold] of olive oil. CROSSE & BLACKWELL, LTD., W. CLAYTON, S. BACK, J. F. MORSE, and R. I. JOHNSON (B.P. 469,113, 18.1.36).—The deposition of stearin from olive oil on keeping at low temp. is prevented by addition of small amounts (<1%) of an oxidised and polymerised glyceride of oleodistearin type, such as is obtained, in particular, by blowing heated cacao butter (cf. B.P. 469,112; B., 1938, 101). E. L.

Expelling the liquid of cashew [and marking] nut shells by heat. E. R. HUGHES, Assr. to HARVEL CORP. (U.S.P. 2,058,456, 27.10.36. Appl., 28.7.32).—Cashew nuts (or marking nuts) are soaked in H₂O, dried at room temp., and immersed (for, e.g., 4–5 min.) in a bath of the shell liquid (or glycerin) at 120–230° (150–175°), whereby the shell liquid is expelled from the nuts in a clean, undiscoloured condition, and the kernels are not scorched. E. L.

Treatment of drying oils, semi-drying oils, corresponding fatty acids, and [polymerised] products derived therefrom. N. V. INDUSTRIE. MAATS. V./H. NOURY & VAN DER LANDE, and R. PRIESTER (B.P. 470,498, 14.12.35).—Drying oils etc., or their chlorinated or hydrogenated derivatives etc., are polymerised in a continuous process wherein the oil etc. passes through a zone in which a catalyst, e.g., Cu, Pt, or anhyd. metallic chlorides, is provided; the products may be fractionally distilled. E. L.

Production of oil from fatty parts of whales. D. A. HANSEN (B.P. 470,223, 12.11.36. Addn. to B.P. 457,348; B., 1937, 186).—Finely-comminuted blubber is heated by indirect heat in a vessel fitted with stirring gear to >60° (40–55°) without any substantial evaporation of H₂O, whereby the oil is readily liberated (e.g., in 15 min.) from the tissues and can be removed by skimming and pressing the greaves. E. L.

Treatment of fatty oils to remove off-taste and stabilise it against rancidity. C. E. MACKE (U.S.P. 2,058,162, 20.10.36. Appl., 28.4.33).—Edible fats, especially castor oil, fish oils, or lard, are treated with, e.g., 10% of a decoction of sage or celery seeds; the removal of off-flavour and stabilisation are attributed to the action of a terpene or sesquiterpene component. E. L.

Manufacture of salad oil. D. P. GRETTIE, Assr. to INDUSTRIAL PATENTS CORP. (U.S.P. 2,050,528, 11.8.36. Appl., 7.6.34).—Crystallisation of "stearin"

at low temp. is inhibited by addition of small amounts of lecithin to refined winterised cottonseed oil. E. L.

Bleaching of sulphonated oils. J. S. REICHERT and A. G. COLE. Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,049,975, 4.8.36. Appl., 9.5.35).—Sulphonated (castor) oil is bleached by treatment with H₂O₂ (e.g., 1% of 100-vol. solution) or a material, e.g., Na₂O₂, yielding H₂O₂ in solution, at, e.g., 32–50°, in presence of a promoter (Co salt) in amount equiv. to, e.g., 5 p.p.m. of Co. E. L.

Manufacture and application of [drying] oils from vinylacetylene. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 474,234, 24.4.36).—CH₂:CH:C:CH obtained as the crude polymerisation product of C₂H₂ is hydrogenated and simultaneously polymerised in presence of a catalyst (Pd, Ni, etc.) at moderate temp. (10–60°). The use of solvents and circulating liquids, control of the properties of the products by subsequent hydrogenation and (thermal) polymerisation, and their application in varnishes, paints, etc. is also claimed. A. H. C.

[Floatable] soap tablets and the like. C. I. MEYER (B.P. 468,108, 13.8.36. Fr., 13.8.35. Addn. to B.P. 445,815).

Treating liquids with gases.—See I. Lubricants. Adhesive grease.—See II. Oil-sol. phenols.—See III. Fat from meat waste etc. Treating chocolate. Emulsions.—See XIX.

XIII.—PLASTICS; RESINS; PAINTS; COATING COMPOSITIONS.

Plastic materials. H. MOLINARI (Mat. Plast., 1937, 4, 133–140).—A lecture.

Thermoplastic materials. ANON. (Brit. Plastics, 1937, 9, 282–287).—A brief account is given of the properties of Trolitul (polystyrene), Mipolam and Astralon (polyvinyl chloride resins), and Oppanol B.

Industrial utilisation of Karafuto tundra peat. I. Manufacture of plastics from peat. M. SHIKATA and S. FUJII (J. Agric. Chem. Soc. Japan, 1937, 13, 761–768).—Plastics prepared from hydrolysed tundra peat are unsuitable for practical use. J. N. A.

Hydro- and oxy-celluloses as fillers for bakelite plastics. G. PETROV and N. KRUGLAJA (Prom. Org. Chim., 1937, 4, 172–180).—The stability to heat, H₂O, and chemical agents of plastics obtained from bakelite and other resins with hydro- and oxy-celluloses as fillers are > with sawdust, and the products have a glossier and more uniform surface. R. T.

Plastics in the automobile industry. A. G. D. CLEAVE (Brit. Plastics, 1937, 9, 280–281).

Plastics and the metal industry. H. R. SIMONDS (Iron Age, 1937, 140, No. 12, 40–45).—The coating of metals used in automobiles with plastics by means of injection moulding is described. R. B. C.

Denture plastics. R. N. JOHNSON (Chem. and Ind., 1937, 1040–1045).—A review of the development of artificial dentures and of recent work on the

application of synthetic resins. Moulding properties, æsthetic qualities, and qualities which determine the life of a denture are discussed. I. C. R.

Composition of Majdi incense from Italian Somaliland. I. E. AFFERNI (Annali Chim. Appl., 1937, 27, 373—381).—The incense contains H_2O 4, resin 62, gum (H_2O -sol.) 20, gum (H_2O - and $EtOH$ -insol.) 8, essential oil 4, and residue 2%. The oil has m.p. -6° , d^{15}_D 0.8736, $[\alpha]_D^{20} +11^\circ 21'$, n^{20}_D 1.468, acid val. 9.5, sap. val. 68, b.p. range 140 — 182° (90%), solubility in dil. $EtOH$ 10—12%. The resin dissolved in $EtOH$ and pptd. with dil. HCl yields a resinous substance, $C_{30}H_{52}O$ (I), m.p. 78 — 84° (Ac, $C_{32}H_{54}O_2$, m.p. 156° , and *Bz* derivatives, m.p. 132°). Oxidation of (I) with CrO_3 yields an acid, m.p. 125 — 130° [NO_2 -derivative, $C_{14}H_{18}O_4N_2$, m.p. 140°]. Oxidation and nitration of the substance obtained by acetylation and saponification of (I) yields a substance $C_{14}H_{18}O_4N_2$, hence (I) is concluded to be a monohydric alcohol. L. A. O'N.

Condensation of phenols with formaldehyde. III. Direct resinification. F. S. GRANGER (Ind. Eng. Chem., 1937, 29, 1125—1129; cf. B., 1937, 1085).—Industrially the formation of phenol alcohols is not separately conducted. Under alkaline conditions (weak bases or small proportions of strong alkali) resinification of the phenol alcohols is slower than their formation and the two stages are easily distinguished. Equimol. proportions of $PhOH$ and aq. CH_2O were refluxed with 0.05 mol. of aq. $NaOH$ for varying times and the mixtures tested for resin, phenol alcohol, and $PhOH$ contents. The results show that hardly any resinification takes place during the first stage, that the phenol alcohols formed are largely poly-alcohols, since $PhOH$ is only partly used up, and that the residual $PhOH$ enters into subsequent resin formation. Strong alkali condensing agent, in proportion >0.2 mol. compared with the phenol, functions dually as solvent and catalyst, and gives homogeneous reaction mixtures for a wide range of phenols and conens. With acid condensation the two stages are not distinguishable (probably resinification of phenol alcohols is faster than in alkaline condensation), and the speed of resinification and curability increase with increasing concn. of reactants and catalyst. To obtain completely curable resins a large excess of CH_2O is required. J. W. CR.

Products of polymerisation of turpentine oil, and their application. B. N. RUTOVSKI, K. ANDRIANOV, and A. LEBEDEV (Prom. Org. Chim., 1937, 4, 104—109).—Turpentine oil yields 50—60% of a dimeride, $C_{20}H_{34}$, b.p. 159 — $160^\circ/6$ mm. (hydrochloride, b.p. 140 — $145^\circ/6$ mm.), when heated for 3—6 hr. at the b.p. with active clay. The dimeride may be used as a plasticiser of urea- CH_2O plastic, the elasticity and resistance to H_2O and NH_3 of which are increased, and the hygroscopicity is reduced. R. T.

Film-forming organic compounds. E. DREHER (Farbe u. Lack, 1937, 547—548, 558—559).—Polymerisation and condensation reactions during oxidation of drying oils and formation of synthetic resins are compared. S. M.

Sadki asphaltite as a basis for enamels. V. SHEBROVSKI and B. JUDIN (Prom. Org. Chim., 1937, 4, 189—190).—The asphaltite is non-fusible; when mixed with colophony or coumarone resin it yields a fusible mass, which may be incorporated into linseed oil to yield a black enamel. R. T.

Helio-gen-Blue. W. LAMBRECHT (Farben-Ztg., 1937, 42, 1165—1166).—A general dissertation is given on the historical development, properties, and uses of the Helio-gen Blues (cf. Monastral Blues). S. S. W.

New lead pigments. ANON. (Paint Tech., 1937, 2, 253—254).—The prep. and properties of $PbCN_2$ and a new form of basic Pb carbonate (I) are described. $PbCN_2$, prepared by pptn. from aq. $CaCN_2$ and a Pb salt, is a yellow pigment suitable for use in anticorrosive paints. (I) is prepared by passing CO_2 into basic Pb acetate solution and is suitable for producing mother-of-pearl effects. Zn salts and org. acids such as anthranilic acid may be added to increase the lustre, and the pigment may be coloured by means of dyes. D. R. D.

Vermilion. W. MANN (Farben-Chem., 1937, 8, 372—376, 383—385).—An account is given (with 40 literature references) of its history, manufacture by dry, wet, electrolytic, and other patented processes, properties, and adulteration. S. M.

German earth pigments. J. F. SACHER (Farben-Chem., 1937, 8, 333—336).—An account is given of the occurrence in Germany, extraction, and uses of barytes, chalk, gypsum, kaolin, white bleaching clay, kieselguhr, graphite, ochres, Cassel-brown, and green earth. S. M.

Pigments for leather lacquers. F. VON ARTUS (Farben-Chem., 1937, 8, 385—387).—Recent developments are reviewed and typical formulations given for casein, shellac, and ethylcellulose media. S. M.

Morphology of pigments. VII. Expression of results of microscopical determination of the degree of dispersion. A. V. PAMFILOV and O. S. FEDOROVA (J. Appl. Chem. Russ., 1937, 10, 1478—1486; cf. B., 1937, 369).—Calculation of the effective diameter of the particles as the arithmetic mean is preferred to the use of more complicated expressions. R. T.

Wetting of pigments by grinding with oils and rust inhibition by painting. Dynamics of oil-absorption of pigments. H. WOLFF and G. ZEIDLER (Korros. u. Metallschutz, 1937, 13, 302—307).—The durability of a paint film is affected by the degree of dispersion of the pigment particles in the oil because close packing provides increased resistance to, e.g., ultra-violet light, and good wetting induces good flow under the brush and hence smooth films free from the furrows in which disruption tends to commence. Close packing means less oil, and as efficient wetting can be obtained either with comparatively small quantities of modern processed oils or by thorough milling with acid-free oils (cf. Schmid, B., 1936, 335) durability becomes a max. with an optimum oil content. The various factors which affect oil absorption and the formation of films around the particles are discussed. S. M.

Pigmentation of emulsion vehicles containing oil. E. A. BECKER (*Farben-Ztg.*, 1937, 42, 1163—1164).—The use, owing to (German) oil shortage, of aq. emulsions relatively lean in oil content as paint vehicles calls for compromise in the types of white pigment used (between those appropriate for oil paints and distempers, respectively). Questions of pigment-binder structure, and consequent durability of the dried paint films, behaviour of binders of various oil content, and the vol. relations of pigment to vehicle in emulsion pastes made from a typical range of paint and distemper pigments are discussed.

S. S. W.

Influence on the pigment of varying [other paint] components. H. WAGNER (*Angew. Chem.*, 1937, 50, 824—827).—Evaluation of pigments as rust inhibitors necessitates prolonged weathering (two years); short exposures give misleading data although weaknesses of the films may become manifest. Pb_3O_4 gave excellent protection with both kinds of test and is improved by addition (up to 50%) of barytes. Natural Fe oxides were inferior to prepared sorts; magnified cross-sectional views show that the former yield markedly uneven films. As rusting tends to commence in the brush furrows the paint must possess good flow. Addition of neutral and basic Pb chromes to Pb_3O_4 and Fe oxides impairs their protective action, but Zn chromate usually enhances it. The varied wetting action for pigments of stand oil, "EL" varnish, etc., the use of kaolin in H_2O -paints and as an extender, and the suitability of a fine cryst. $BaSO_4$ for oil-bound paints are also discussed.

S. M.

Accelerated testing of rust-inhibitive pigments. H. WAGNER (*Korros. u. Metallschutz*, 1937, 13, 297—302).—In a rust-protective paint system each coat performs different functions. The primer must provide an adhesive, elastic, hermetic medium which absorbs or neutralises the oil-decomp. products (H_2O and acids) and may also possess passive action; the top coat must be weather-, H_2O -, and gas-resistant, mechanically strong, and must prevent passage of ultra-violet light. Hence a pigment which is effective in a primer may fail in the top coat. Exposures in accelerated-weathering machines do not distinguish these various functions and should be supplemented by tests for H_2O -absorption, pH val., SO_2 -resistance, passivation, oil-absorption, hardness etc., and light-transparency. To each of these, according to its importance, primer and top-coat vals. are given; a pigment thus receives two overall evaluations, and data for ten coloured pigments are listed. Pb_3O_4 , even when extended with 50% of barytes, and basic Pb-chrome are efficient in both primers and top coats; normal Pb-chromes and Fe oxides function best in top coats; Zn chromate and monoclinic $PbCrO_4$ are best in primers.

S. M.

Chinese ink. Y. H. YU (*Chemistry, China*, 1935, 2, 779—782).—The quality of the ink depends on the source of the lampblack, the best raw materials being tung oil or rosin. Camphor or menthol may be included as preservative etc. Data for ten brands of ink are given.

CH. ABS. (e)

Problems connected with modern developments in printing ink. H. A. IDLE (*J. Oil Col. Chem. Assoc.*; 1937, 20, 333—347).—A discussion.

S. M.

Printing with rapid-drying inks. C. MACARTHUR (*Paper Trade J.*, 1937, 105, TAPPI Sect., 219—220).—Problems encountered in the use of rapid-drying inks are reviewed. The application of Vaporin inks is described. In this type of ink, which consists of solid rosin, pigment, and high-boiling solvent, mere physical deposition (as distinct from oxidation) of the solid ingredients is obtained by volatilising the solvent by the use of special gas burners carefully applied to the printed side of the paper.

H. A. H.

Embossing powders. P. H. FAUCETT (*Drugs, Oils, and Paints*, 1937, 52, 372).—The process of embossing by pouring a resin powder over wet print and subsequently melting the resin is discussed. The manufacture and properties of embossing powders are described, formulæ based on a rosin-shellac mixture, glyptal resin, and ester gum, respectively, being given.

D. R. D.

Linseed oil stand oil. K. VETTEWINKEL (*Verf. kroniek*, 1937, 10, 186—188).—Mixtures of linseed oil of η 0.50 poise with stand oils of different η were prepared, such that all the mixtures had η 1.25 poises. From these, white-Pb paints were made and their dispersion, brushability, flow, gloss, durability, and general appearance were compared. The best results were obtained with stand oil of $\eta \sim 60$ poises.

D. R. D.

Economy in use of boiled oils, oil substitutes, and improved linseed oils. W. MEGERT (*Farbe u. Lack*, 1937, 486—487, 497—498).—In making paints the proportion of vehicle can be reduced by using unpolymerised oils having definite acid val. or stand oils; in both cases wetting of pigments is improved. "Bis-oils" (produced by blowing linseed oil at 280—305° for a short period) have good wetting power and such low η that little or no thinner is required. Other oil economies are the use of synthetic resins, e.g., as in "EL" varnish, and oil- H_2O emulsions. The high oil absorption of wood primers can be reduced by incorporating Al stearate etc. or by using an oil having high η . Modifications in the properties of linseed oil under the influence of heat, light, electric current, and S_2Cl_2 are reviewed.

S. M.

Protective coatings on emulsion basis. B. SCHEIFELE (*Farben-Ztg.*, 1937, 42, 1139—1141).—Pigmented pastes, based on aq. synthetic resin emulsions containing relatively small proportions of oil, are reduced to brushable consistency by adding 35—40% of H_2O , to give hard, tough, and durable films. Details of tests on such emulsion paints on primed and unprimed metal panels (as well as on cement, plaster, wood, etc. to which earlier paints of this type were limited), in comparison with a linseed-wood oil enamel and a linseed oil paint, are tabulated and discussed.

S. S. W.

Protection of material by means of paint. Protection of iron and steel, wood, and aluminium and magnesium alloys against the influence of corrosion and weathering. H. L. MATTHIJSEN

(Verfkroniek, 1937, 10, 165—172, 189—195, 208—213).—A comprehensive review and bibliography of published work on the influence of the composition and condition of the base material (metal etc.), methods of pretreatment (phosphatising etc.), and composition of the paints used on the weather-resistance of painted materials. D. R. D.

Painting light and heavy metals. O. T. KORITNG (Korros. u. Metallschutz, 1937, 13, 307—315).—The removal of old films, composition of various paints, their application to Fe, Al, Al and Mg alloys and machinery, and the acceleration of drying by O_3 , hot air, and use of vehicles free from linseed oil are described. For protection of all metals against sea- H_2O an aq. emulsion of mineral oil asphalt is recommended; it is heat-resistant and remains elastic at low temp. Equations are also developed for calculating the heat required by a drying apparatus and the heat losses. S. M.

Rust protection of light alloys by painting. B. SCHEIFELE (Korros. u. Metallschutz, 1937, 13, 317—319).—An account is given of the requirements necessary in a paint for this purpose and of modern developments. Pigments which function as good passifiers for Fe are not necessarily satisfactory for Al and Mg, because of differences in their reactivities. Zn chromate in a phenolic resin lacquer provides an efficient ground-coat for Al alloys; ZnO in a polyvinyl acetate-resin lacquer is recommended for Mg alloys. Al bronze, Fe oxides, lithopone, and barytes are indifferent; Pb_3O_4 , white-Pb, Cu compounds, and Prussian-blue may promote corrosion. Replacement of natural by synthetic products, e.g., phenolic, alkyd, and vinyl resins and chlorinated rubber, has led to improved adhesion, durability, and resistance to chemicals. S. M.

Tall oil as vehicle for rust-preventive paints. ANON. (Farben-Ztg., 1937, 42, 1091).—Rust-preventive paints based on tall oil, tall oil ester, or tall oil fatty acids, in conjunction with linseed oil, fish oil, alkyd resin, copal ester, etc., were exposed for 1 year on steel panels at 45° facing south. Records of hardness, degree of rusting, and general appearance after 4, 8, and 12 months are tabulated; these indicate that tall oil is of considerable val. in this field, especially from the aspect of linseed oil conservation. S. S. W.

Metal-work finishes for outside exposures. E. E. HALLS (Paint Manuf., 1937, 7, 209—213, 256—258, 277—278).—The properties and uses of oil, cellulosic, and synthetic resin finishes are compared. D. R. D.

Matt paints for machinery. E. STOCK (Farben-Chem., 1937, 8, 365—366).—Control of matt and egg-shell effects by variation mainly in the proportions of thinners and pigments is discussed. S. M.

Ships'-bottom paints. II. E. STOCK (Farben-Ztg., 1937, 42, 1115; cf. B., 1937, 1238).—Further experimental formulæ for such paints and general notes on their usage are given. S. S. W.

Under-water protection for ship surfaces. H. C. SKEENS (Paint Manuf., 1937, 7, 315—316).—

The use of anticorrosive and antifouling paints is described. D. R. D.

Paints and mould growth. L. D. GALLOWAY (Paint Manuf., 1937, 7, 317—318).—The causes and prevention of mould growth on paint are discussed. Data concerning the relative toxicities to moulds of well-known mould inhibitors are quoted. Of the substances considered, $C_6H_2Cl_3 \cdot OH$ and $C_6H_2Br_3 \cdot OH$ and org. Hg compounds such as $o\text{-HgCl} \cdot C_6H_4 \cdot OH$ have the highest toxicity to moulds. D. R. D.

Tar varnishes and paints. E. STOCK (Farben-Ztg., 1937, 42, 1141—1142).—The use of coal- or wood-tar products, after suitable dehydration (heating at 120°) and neutralisation (with CaO), as paint vehicles is discussed and typical formulæ are quoted. S. S. W.

Paint film failures and their causes. R. KLOSE (Farbe u. Lack, 1937, 535—536).—Photomicrographs show failures by H_2O -absorption in rust-protective paints, enclosure of H_2O during sandblasting of the surface or spraying of the lacquer, too rapid evaporation of the diluent, absence of the correct plasticiser from a nitrocellulose lacquer, and application of wet labels containing gum arabic etc. S. M.

Retarding effect of some metallic soaps on breakdown of drying oil films. G. F. NEW (J. Oil Col. Chem. Assoc., 1937, 20, 352—355).—Exposure tests with TiO_2 , TiO_2 -ZnO, and TiO_2 -white-Pb paints show that incorporation of 3% (calc. on the non-volatile portion) of Cr oleate retards chalking and prolongs the life of the films to a marked extent. Sn resinate and oleate were effective with a TiO_2 but not with the TiO_2 -ZnO paint. S. M.

Simplified testing methods for paint films. E. ROSSMANN (Angew. Chem., 1937, 50, 854—856; cf. B., 1937, 945).—Factors, e.g., thickness of plate and film, composition and surface texture of the plate, temp., affecting the results obtained by the Erichsen tester are discussed; in particular, the rate of deformation should be standardised (e.g., at 1 mm./10 sec.) and the first fine cracks in the film should be detected with a lens. The H_2O -permeability of films is also discussed. E. L.

Properties of plasticisers for nitrocellulose lacquers. VIII. A. KRAUS (Farbe u. Lack, 1937, 509—510, 521—522, 533—534; cf. B., 1937, 467).—Further exposure tests are reported with old and new plasticisers; esters of carbamic and cinnamic acids were satisfactory; di- was markedly inferior to tri-phenylurea. From a survey of all the results $o\text{-C}_6\text{H}_4(\text{CO}_2\text{Ph})_2$ is the most useful. Many compounds which usually are efficient failed, through either film disruption or yellowing, when the resin-free lacquer was spread on a white enamel; of 49 thus tested only four maintained a protective film after exposure for one summer. Yellowing under the ultra-violet lamp was not always concordant with that obtained by outside exposure. $o\text{-C}_6\text{H}_4(\text{CO}_2\text{Bu})_2$ with either Casterol or Bu stearate is recommended for finishing lacquers for leather, and $(\text{C}_6\text{H}_4\text{Me})_3\text{PO}_4$ with castor oil for artificial leather. S. M.

Synthetic and semi-synthetic lacquers. G. KLINKENSTEIN (Metal Ind., N. Y., 1937, 35, 454—455).

—The val. and uses of this group of metal finishes are described. L. S. T.

Special finishes for metal products. G. KLINCKENSTEIN (Metal Ind., N.Y., 1937, 35, 507—508).—Special decorative and protective coatings are described and illustrated. L. S. T.

Lacquers for metal products. I, II. G. KLINCKENSTEIN (Metal Ind., N.Y., 1937, 35, 347—348, 404—405).—I. The properties required by satisfactory lacquers for brass, Cu, Ag, and other metals are discussed.

II. The lacquering of various metals is described, and the prevention of stain spotting discussed. L. S. T.

Decorative stop-off lacquer for chrome-plating. L. ROON (Metal Ind., N.Y., 1937, 35, 562—563).—Advantages in the use of lacquer enamels that buff easily and act as a stop-off for plating solutions to give chrome and colour two-tone effects are discussed. L. S. T.

Purchase and use of lacquers by metal manufacturers. G. KLINCKENSTEIN (Metal Ind., N.Y., 1937, 35, 285—287).—Practical considerations are discussed and plant is illustrated. L. S. T.

Nitrocellulose stoving lacquers. A. KRAUS (Farben-Ztg., 1937, 42, 1113—1114).—Nitrocellulose (I) can be incorporated into stoving lacquers for subsequent stoving at temp. well above those normally used with orthodox (I) lacquers. Details are given of such lacquers incorporating non-drying oils and plasticisers, shellac, and glyptal, urea- CH_2O , and $\text{PhOH}-\text{CH}_2\text{O}$ resins, the accelerating effect of (I) on the drying of the other constituents being stressed. S. S. W.

Hot-lacquering. E. E. HALLS (Oil and Col. Tr. J., 1937, 92, 903—905).—Accelerated tests indicate that the durability of stoved glyptal-type lacquers on metal is slightly superior to that of stoved bakelite-type lacquers, and that the latter are markedly superior to shellac lacquers (applied to the hot metal but not stoved). D. R. D.

Properties of lacquer films as function of pigment-binder ratio. UNTERSUCHUNG U. FORSCHUNGSLAB. F. LACKE U. FARBEN (Farben-Ztg., 1937, 42, 1062—1063, 1087—1089).—The "crit. pigment concn." information obtained for pigment-linseed oil or -stand oil mixtures is not adaptable to other paint vehicles, but determination of the variation of physical properties (elasticity, tensile strength, etc.) of nitrocellulose and chlorinated rubber lacquers with the pigment-binder ratio shows evidence of crit. points in some, but not all, of the properties observed. S. S. W.

Swelling of drying oil films in water. J. RINSE and W. H. G. WIEBOLS (Ind. Eng. Chem., 1937, 29, 1149—1154).—A method of measuring the swelling to an accuracy of 1—2% is described. After preliminary experiments, a film thickness of 30 μ . and a drying time of 14 days were adopted as standard and driers were added according to standard varnish technique (viz., Co 0.1, Pb 0.4, or Mn 0.1%, on oil content). With linseed oil, Pb films absorb more O_2 during drying, or lose less oxidation products, dry more slowly, and swell more than Co or Mn films,

but with tung, oiticica, and Synourin oils (made by dehydrating castor oil by the Scheiber method) the swelling of Pb films is < that of Co films. Films baked at 70° show less wt. increase by oxidation than air-dried films, and are more H_2O -resistant. Repeated cleaning and removal of adhering H_2O does not significantly influence the results. The losses (viz., leaching of sol. and volatile substances) of Co films during swelling are > for Pb films. Of raw oils, tung oil is more H_2O -resistant than linseed, perilla, and lumbang oils, and rather more resistant than oiticica oil. Bodied tung oil is also more resistant than bodied oiticica and linseed oils; boiled Synourin oil is intermediate. Raw and thin stand oils swell rapidly to a max. (highest for raw oil), but as η increases so swelling is more gradual and final stable swelling was not attained. Tung oil when mixed with linseed oil imparts greater H_2O -resistance than is \propto its quantity, but the effect of oiticica oil is not so marked. J. W. CR.

Accelerated exposure tests for oil varnishes. C. A. TOGNONI and A. L. TROLLET (Chim. et Ind., 1937, 38, 647—656).—The results are tabulated of exposure tests in Argentine of 24 varnishes (composition not stated) spread on cedar-wood panels and exposed (a) in a weatherometer, (b) on a roof, and (c) on a railway wagon. If the cycle in (a) is adjusted to the prevailing weather the course of film destruction is comparable with (b) and (c) and requires $\frac{1}{14}$ — $\frac{1}{15}$ of the time for (b) and $\frac{1}{24}$ — $\frac{1}{30}$ of that for (c). S. M.

Explosion hazard with EL varnish. W. MEYER (Farbe u. Lack, 1937, 511—512).—Consideration of the proportion of volatile components in EL varnish (B., 1936, 1055) and the explosion limits of hydrocarbons indicate that the varnish is safe in use. Nevertheless, precautions with regard to good ventilation, absence of lights, etc. are urged. S. M.

Bearings. Light-scattering materials [paints]. Gloss measurement.—See I. Lubrication of synthetic resin-bonded bearings.—See II. Dissolving cellulose derivatives.—See V. Synthetic resins and textile finishing.—See VI. Annealing synthetic resins.—See VIII. Bearing-metal substitutes.—See X. Artificial materials [resins] for rubber industry.—See XIV.

See also A., II, 510, Resins of German conifers.

PATENTS.

Softening of nitrocellulose plastics and compositions therefor. E. I. DU PONT DE NEMOURS & Co. (B.P. 474,762, 5.5.36. U.S., 9.5.35).—Nitrocellulose plastics (celluloid) are softened with an aq. solution of MeOH and one or more branched-chain aliphatic ketones which are immiscible or not completely miscible with H_2O . The ketones preferably contain >9 C and have b.p. between 115° and 128°, viz., COMePr^2 , COEtPr^2 , and COPr^2 ; the ketone-MeOH mixture contains 9—25 (13) vol.-% of ketone, and 3—4 (3.25) vols. are mixed with 1 vol. of H_2O . These softeners have no deleterious effects on the operator and do not appreciably dissolve camphor. R. G.

(A) Treatment of rosin [with alkylamines etc.] and rosin product. (B) Halogenation of com-

pounds containing an abietyl group. (A) J. N. BORGLIN and L. N. BENT, (B) J. N. BORGLIN, Assrs. to HERCULES POWDER CO. (U.S.P. 2,050,263 and 2,050,979, 11.8.36. Appl., [A] 5.4.34, [B] 23.2.35).—(A) Alkylamine and ethanalamine hydroxyabietates etc. (and salts thereof) obtained as by-products in the process of U.S.P. 1,995,600 (B., 1936, 337) are claimed. (B) A hot solution of the compound, e.g., rosin, in, e.g., CCl_4 is treated with a halogen; a catalyst, e.g., anhyd. AlCl_3 , is present at least for the completion of the reaction. S. M.

Manufacture of modified vinyl resin. I. M. JACOBSON, Assr. to COE LABS., INC. (U.S.P. 2,050,843, 11.8.36. Appl., 6.4.33).—Discoloration during hot-moulding is prevented by incorporating an antioxidant which may be a thiol derivative, e.g., K ethylxanthate, *p*-thiocresol, and/or a morpholine. S. M.

Preparation of condensation products. BECK, KOLLER & CO., Asses. of BECKACITE KUNSTHARZFABR. G.M.B.H. (B.P. 474,465, 21.5.36. Ger., 25.5.35).—PhOH or a homologue (cresols, naphthols, etc.) (I) is caused to react in presence of halides of Al, Zn, and Fe (or substances forming them under the reaction conditions, e.g., Zn dust) with halogen compounds (II) obtained from H halides (HCl) or halogens (Cl_2) and terpenes or their derivatives, acyclic compounds which are easily converted into alicyclic compounds (olefinic terpenes), or those indefinite compounds formed by heating high mol. wt. terpenes (copal resins). (I) may be used in excess and the excess removed (by vac. or steam-distillation) or converted into substitution products (e.g., with Bu^nCl); or (II) may be in excess and (I) completely converted, and the oily or soft resinous products may be converted into solid products by long heating in presence of the metal halide and H halide. In the case of terpene-like compounds which do not form H_2O by interaction with H halide, the latter may be formed by interaction between (I) and an org. halide (BzCl). (II) may be treated with halogen (Cl_2) before interaction with (I) to obtain condensation products specially rich in halogen and containing a high proportion of combined (I). The condensation products are used as raw materials for varnishes, particularly oil varnishes. R. G.

Manufacture of polyhydric alcohol-polybasic acid resins. K. SANDIG (B.P. 474,620, 8.5.36).—A polycarboxylic acid (I) and a polyhydric alcohol (II) are heated (200—300°) for several hr. with a monocarboxylic acid (III), (II) being $\gt 27\%$ in excess of the quantity equiv. to the acids; the temp. is lowered and further quantities of (I) and (II) are added, the total quantity of (I) exceeding that of (III) used in the first stage, and the whole mixture is further heated at a temp. 20—100° $<$ that of the first stage. (I) may be substituted, wholly or in part, with the corresponding quantity of the anhydride, and (III) by its glyceride, the glycerol in the latter being reckoned as part of (II). Catalysts (Ca resinates) may be added. Claims are made where (I) is phthalic, adipic, succinic, maleic, or citric acid, $(\text{CO}_2\text{H}\cdot\text{C}_2\text{H}_4)_2\text{O}$, or Manila copal acid, (II) is glycerol, $(\text{CH}_2\cdot\text{OH})_2$, polyglycol, polyglycerol, mannitol, or erythritol, and (III) consists of fatty acids (e.g., tall oil or those of

linseed, tung, or castor oil), a resinic acid (abietic acid), or an org. acid such as BzOH. The products are useful for paints and lacquers, particularly for oven-drying. R. G.

Treatment of [coumarone-indene-type] resins. S. P. MILLER, Assr. to BARRETT CO. (U.S.P. 2,064,487, 15.12.36. Appl., 2.10.30).—Resin is prepared in the form of hollow tubes or granules by spraying it molten at 170° in a stream or streams $\frac{1}{8}$ — $\frac{3}{16}$ in. diameter into a cooling liquid in which it is insol., e.g., H_2O at 60—80°. D. M. M.

Production of moulding resins. K. M. IREY and L. C. SWALLEN, Assrs. to RESINOX CORP. (U.S.P. 2,059,526, 3.11.36. Appl., 13.7.33).—Moulding resins of light colour, good fastness to light, and low hygroscopicity are produced by interaction of (approx. 6 pts. of) a bis(hydroxyaryl)dialkylmethane (I) [$\beta\beta$ -bis-(4-hydroxyphenyl)propane, m.p., 150—154°] and (approx. 4 pts. of) the condensation product of this with 1 mol. of a ketone (COMe_2), with an excess of an aldehyde (CH_2O), viz., ≈ 0.6 mol. per mol. of the phenol used in making the mixture of (I) and ketone, in presence of an alkali catalyst, e.g., $\text{Ba}(\text{OH})_2$ at $\gt 100^\circ$ (50—80°), and finally dehydrating the mixture in vac. (at $< 75^\circ$). N. H. H.

Cold sealing wax composition. W. HOCHGESAND (B.P. 471,781, 7.9.36).—The ointment-like paste comprises a cellulose ether (e.g., ethyl- or benzyl-cellulose) dissolved in a volatile solvent, a mineral filler, a dye, and a natural or artificial resin in amount \approx that of the cellulose ether, to yield a non-curling seal. E. L.

Manufacture of emulsions and dispersions [for coatings etc.]. CHEM. FORSCHUNGSGES. M.B.H. (B.P. 475,162, 12.5.36. Ger., 13.5.35).—Emulsions and dispersions (e.g., of vinyl esters, chloroprene, styrene) in H_2O are stabilised by adding $\gt 1\%$ (of the substance to be emulsified) of an ester, ether, or acetal of a polyvinyl alcohol which may be partly saponified and is sol. or partly sol. in H_2O , or of the partly saponified product obtained by polymerising a vinyl compound in presence of a polymerised or polymerising fatty oil. The simultaneous polymerisation and emulsification of compounds containing the group $:\text{C}:\text{CH}_2$ in presence of $\gt 4\%$ of the above stabilisers is also claimed. A. H. C.

Apparatus for production of plastic material in sheet form. DU PONT VISCOLOID CO. (B.P. 474,243, 27.4.36. U.S., 27.4.35).

Moulding [discs] of plastic substances. W. R. WILKINSON & CO., LTD., and J. T. JOHNSON (B.P. 473,360, 14.4.36).

Producing vitreous or metallic surfaces. Measuring colour change.—See I. [Resinous] tar-distillation product.—See II. Esters. Substituted phenols.—See III. Coating abrasives. Resin-bonded abrasives. Sandpaper.—See VIII. Surface dressing for tennis courts. Coated materials. Hard or plastic masses. Inlays for wood.—See IX. Lacquered wire.—See X. Oils from vinylacetylene.—See XII. Rubber-like compositions.—See XIV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Purification and concentration of rubber latex with especial reference to dialysis.

H. P. STEVENS, J. W. W. DYER, and J. W. ROWE (J.S.C.I., 1937, 56, 397—403r).—A dialyser is described (cf. B.P. 458,130; B., 1937, 161) which holds 4 gals. of latex, operates under pressure, and, in 8—9 hr., is capable of removing 80—85% of the diffusible "impurities." Part of the latex forms a paste (which with care can be redispersed) on the membrane, but this deposit can be minimised by allowing a concurrent dilution of approx. 15% during dialysis. The degree of paste formation is related to the mol. wt. of the diffusible material undergoing removal, and an explanatory theory is offered. The purified latex can be reconc. (with periodic addition of NH_3) by simple evaporation or by spray-drying. Dialysed latex after evaporation to 60% concn. has a relative η of 0.7, the corresponding figure for normal latex being 5.0; the η val. for spray-conc., dialysed latex is still lower. D. F. T.

[Rubber] factice. F. KIRCHHOF (Chem.-Ztg., 1937, 61, 867—869, 886—888).—A survey is given dealing with the historical development, chemistry, production, application, and advantages of the "rubber substitutes" obtained by the interaction of unsaturated vegetable or animal oils with S or S_2Cl_2 . D. F. T.

Artificial materials with especial reference to the requirements of the rubber industry. A. SCHWARZ (Kautschuk, 1937, 13, 183—188).—An account is given of the mode of formation of various types of synthetic resin, especially of the polyvinyl and polyacrylate classes, with some reference to their mol. structure and to their use for incorporation in, or replacement of, rubber, e.g., for products exhibiting oil-resisting or electrical insulating qualities. D. F. T.

Influence of crystallographic transformation of sulphur on course of vulcanisation. J. A. HEDVALL and A. LARSSON (Kautschuk, 1937, 13, 188—189).—On vulcanising a no. of samples of rubber mixing at different temp. between 92° and 98.2° for 45 min. it is found that the rate of combination of rubber and S shows a max. at 95—96°. This result corresponds with an observed max. in the rate of dissolution and of oxidation of S at the temp. at which rhombic S undergoes transformation into the monoclinic form (cf. A., 1934, 1073).

Qualities of sponge rubber as a material for vibration- and shock-damping. C. W. KOSTEN and C. ZWIKKER (Physica, 1937, 4, 843—852).—For vibration-damping purposes the sponge rubber should possess great porosity, be made of soft rubber, and, in particular, should have very fine pores. A theoretical discussion is given. K. S.

Modern problems in the regeneration of old rubber. F. KIRCHHOF (Kautschuk, 1937, 13, 169—173, 189—194).—An account is given of the development and nature of the various methods for regenerating vulcanised rubber scrap, the influence of chemical agents and of mechano-thermal treatment for plasticising, the effect of repeated vulcanisation and

regeneration on the properties of the material, the regeneration of vulcanised synthetic rubbers, and the evaluation and advantages of regenerated rubber. D. F. T.

Absorption of water by rubber. II. Mixings containing [rubber] reclaim. L. H. N. COOPER and H. A. DAYNES (J. Rubber Res., 1937, 15, 133—138; cf. B., 1937, 265).—Considerable proportions of whitening, PbO , and lampblack can be incorporated in rubber without seriously affecting the H_2O -absorption; C black, however, increases the H_2O -absorption and different lots appear to vary considerably in this respect. Addition of reclaim causes progressive increase in H_2O -absorption, the effect being much greater with alkali- than with acid-reclaim, doubtless on account of the H_2O -sol. impurities in the former. A sample of alkali tyre reclaim gave an increase in H_2O -absorption approx. twice as great as one of alkali shoe reclaim. D. F. T.

Rubber bearings.—See I. **Spectral analytical methods.**—See XI.

PATENTS.

Treatment of [rubber] latex. R. W. ELDRIDGE, ASSR. to UNITED STATES RUBBER CO. (U.S.P. 2,056,569, 6.10.36. Appl., 29.6.34).— NH_3 , alkali, and naturally occurring alkaline-earth metals are removed from latex by treatment with an appropriate zeolite. Latex containing an alkali soap can be thickened by such treatment and articles can be manufactured by applying (alkali-preserved) latex to a shaped form the surface, at least, of which comprises an alkaline-earth zeolite. D. F. T.

Production of rubber sheet and rubber tape [from latex]. INTERNAT. LATEX PROCESSES, LTD., E. A. MURPHY, and R. G. JAMES (B.P. 470,722, 5.6.36).—An aq. dispersion of rubber flows from an orifice of appropriate width down a supporting surface and on to the surface of a coagulant. Apparatus is described. D. F. T.

Treatment of rubber surfaces. R. H. GERKE, ASSR. to UNITED STATES RUBBER CO. (U.S.P. 2,057,717, 20.10.36. Appl., 4.5.33).—A flexible, hardened "slip-finish" is produced on rubber articles (containing <3% of combined S) by treating the surface with a mixture comprising conc. H_2SO_4 and a (minor proportion of a) H_2O -sol. aliphatic alcohol (glycerol). D. F. T.

Rubber manufacture. J. W. SCHADE, ASSR. to B. F. GOODRICH CO. (U.S.P. 2,059,284, 3.11.36. Appl., 4.4.33).—Vulcanisable rubber (thread) is stretched ($\leq 100\%$) and in this condition is vulcanised until a soft vulcanised rubber is obtained. The rubber retains a substantial part of the applied elongation without losing its capacity for further extension and shows improved resistance to abrasion and chafing. D. F. T.

Manufacture of rubber. A. K. EPSTEIN and B. R. HARRIS (U.S.P. 2,059,448, 3.11.36. Appl., 16.2.35).—A relatively small proportion of a derivative of an aliphatic polyhydroxy-substance (I) (glycerol, glycols, polyglycerols, sugars, sugar alcohols) having at least one alkyl or (fatty) acyl group of high mol. wt. and at least one free OH attached to C of (I),

is incorporated in rubber (as a softening and plasticising agent). D. F. T.

Synthetic rubber composition. HERCULES POWDER CO., Asses. of E. OTT (B.P. 470,168, 19.1.37. U.S., 31.1.36).—Oil-resistant compositions, obtained by mixing polymerised chloroprene and a gasoline-insol., chlorinated paraffin wax (<52% Cl), possibly together with other compounding ingredients, are claimed. D. F. T.

Preparation of rubber-like compositions. J. E. WOLFE, Assr. to B. F. GOODRICH CO. (U.S.P. 2,050,595, 11.8.36. Appl., 20.1.32).—A polymerised vinyl chloride, insol. at room temp., is dissolved in a heated plasticiser (with the aid of a more volatile solvent); the mass is then shaped and exposed to actinic radiation. D. F. T.

Manufacture of composite rubber articles. B. J. HABGOOD, L. B. MORGAN, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 470,269, 11.2.36).—Natural rubber is bonded to synthetic rubber-like material made by interpolymerisation of a mixture of butadiene (or homologues) and polymerisable substances, $\text{CRR}'\text{CR}''\text{CN}$ or $\text{CRR}'\text{CR}''\text{CR}'''\text{O}$ (R, R', R'' are H or alkyl, R''' is alkyl or alkoxy) by interposing, in good contact, a layer of a synthetic rubber-like material made by polymerisation of butadiene (or homologues) and vulcanising. (Cf. B.P. 360,821—2; B., 1932, 237.) D. F. T.

Manufacture of sponge rubber articles. W. S. ROBINSON, Assr. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 2,059,278, 3.11.36. Appl., 24.11.33).—A dried mixture of animal or vegetable fibres and rubber is mixed with a relatively heavy mineral oil so as to render the fibres H_2O -repellent. The usual ingredients, including gasifying agents, are then incorporated and the mixture is vulcanised. D. F. T.

Treatment of rubber. E. B. CURTIS, Assr. to UNITED STATES RUBBER PRODUCTS, INC. (U.S.P. 2,049,415, 4.8.36. Appl., 27.8.35).—Development of porosity in rubber insulation on wire during vulcanisation by heat is prevented by incorporating an org. accelerator (a thiuram sulphide) and approx. 1 wt.-% (on the rubber) of MgO . D. F. T.

Rubber vulcanisation accelerator. W. F. TULEY, Assr. to UNITED STATES RUBBER PRODUCTS, INC. (U.S.P. 2,049,785, 4.8.36. Appl., 31.1.36).—A solid accelerator easily dispersible in rubber is obtained by blending the Zn salt of a mercaptobenzothiazole and a heavy-metal (Zn) salt of coconut oil acids. D. F. T.

Manufacture of chlorinated rubber. (A) L. T. DOD, (B) L. W. WEICKHARDT, and [A, B] IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 470,268 and 471,818, [A] 11.2.36, [B] 10.3.36).—(A) Chlorinated rubber (of low η) is obtained by heating the rubber (for 2—80 hr.) in presence of air or O_2 (with an oxidation catalyst, e.g., Cu stearate) at 90—130° (100—120°) prior to chlorination (in CCl_4). (B) The packing density of chlorinated rubber is increased by subjecting the solid to the vapour of a solvent (C_6H_6 , CCl_4 , C_2HCl_3) at > the b.p. (<130°), and subsequently removing

residual solvent before substantial condensation has occurred. D. F. T.

Rubber derivatives. WINGFOOT CORP. (B.P. 467,772, 2.7.36. U.S., 10.7.35).—A solution of rubber (in C_6H_6) is treated near its b.p. with a halide of an amphoteric element (SnCl_4 , FeCl_3 , BF_3 , SnCl_2 , TiCl_4). The treatment is terminated by mixing with H_2O (containing Na_2SO_3). D. F. T.

Low-temperature preparation of rubber hydrohalides. MARBON CORP. (B.P. 474,841, 27.5.36. U.S., 17.6.35).—See U.S.P. 2,047,987; B., 1937, 1379.

Separating rubber latex.—See I. Rubber-bonded abrasives.—See VIII. Wood-rubber composition.—See IX.

XV.—LEATHER; GLUE.

Analysis of common vegetable tannin materials found in Szechwan. Y. L. KAO and N. J. HSIAO (J. Chem. Eng. China, 1937, 4, 257—260).—Analytical data and production costs of vegetable tannin from local sources are tabulated. Valonia, willow, oak, and pine barks are the most favourable raw materials. E. H. S.

Report of the A.L.C.A. Non-Tannin Committee, 1936—7. L. SHEARD (J. Amer. Leather Chem. Assoc., 1937, 32, 474—478).—Variations of temp. between 20° and 25° in filtering vegetable tanning infusions are shown to influence the % of sol. solids found. It is confirmed that perforated plates may be used to replace cloths for the filtration of hide powder. Blanks on the non-tannin determination are high and increase with the amount of liquid squeezed out of the hide powder. D. P.

Proposed mechanism for adsorption of acids and bases by protein materials, with special reference to the system hydrogen chloride-hide protein. L. R. PARKS and A. D. MELAVEN (J. Physical Chem., 1937, 41, 1101—1105).—The rate of adsorption of HCl gas by hide powder decreases with successive additions, in agreement with the author's theory (B., 1936, 706). F. R. G.

Distribution of electrolytes in the drum during chrome-tanning. G. D. McLAUGHLIN and R. S. ADAMS (J. Amer. Leather Chem. Assoc., 1937, 32, 478—481).—The distribution in pickling and tanning is influenced by the nature of the pickling treatment employed. D. P.

Electronic theory of tanning. VI. New views of chemical combination. J. A. WILSON (J. Amer. Leather Chem. Assoc., 1937, 32, 494—513; cf. B., 1937, 704).—It is suggested that every atom in any compound furnishes one half of the electrons that it shares with another atom, that the electrical balance between protons of the atom and the electrons associated with them is maintained, and that the production of stable electron pairs and octets is not important. Electron configurations, based on these assumptions, for the compounds between hide protein and various tanning agents are given. The mode of combination of hide with pure NaPO_3 and HCl is the same. The tanning action of a chrome liquor, at a given p_{H} , is reduced by addition of HCO_2Na , but a

higher p_H can be used for tanning without pptn. of Cr, resulting in a nett increase in the amount of Cr combined with hide protein. D. P.

Water-absorption of vegetable-tanned sole leather. R. O. PAGE and H. C. HOLLAND (J. Soc. Leather Trades Chem., 1937, 21, 577—581).—The voids, free H_2O , and initial rate of H_2O -absorption are reduced by rolling vegetable-tanned leather. Max. reduction is obtained with leather containing 20—23% of H_2O . The free H_2O in the leather is unaffected by the nature and amount of H_2O -sol. matter, but is diminished by increasing the degree of tannage of the leather. The initial rate of H_2O -absorption is not much affected thereby, but is reduced by increasing the content of difficultly-sol. tannins. D. W.

Micro-anglemeter for measuring fibre bundle angulations in heavy leather. F. O'FLAHERTY (J. Amer. Leather Chem. Assoc., 1937, 32, 488—493).—A method of fixing a protractor and needle to the ocular of a microscope and its use in measuring the angle of weave of leather sections is described. This angle, for sections taken from different parts of a fresh hide, varies from 15° to 20° in the belly and from 65° to 70° in the kidney region of the bend. D. P.

Leather lacquers.—See XIII.

See also A., III, 504, [Tannins of] South American bark, *Chuchuhuasha*.

PATENTS.

Tanning of leather. H. S. SHAW (U.S.P. 2,049,547, 4.8.36. Appl., 13.6.32).—Tanning is expedited by successively subjecting the hide to a solution containing principally $NaHSO_3$ and to one containing a fast dye to establish an initial colour in the hide before this is treated with tanning liquor. Before, jointly with, or alternatively to the dye treatment, aq. CH_2O may be applied (with a small proportion of tannin). D. F. T.

Treatment of chrome-tanned leather. A. H. STEVENS. From HALL LABS., INC. (B.P. 472,164, 9.3.36).—The tanned, shaved leather is washed, treated with dil. aq. $NaPO_3$ or other polyphosphate, then washed, dyed, and finally fat-liquored with a fat-liquor of p_H 4.0—4.5. D. W.

Manufacture of velvet leathers. J. J. CALLAHAN, Assr. to TURNER TANNING MACHINERY CO. (U.S.P. 2,054,069, 15.9.36. Appl., 24.8.35).—French chalk is drummed with pickled pelts, from which a thin grain layer is subsequently removed by a scraping-cutting operation, e.g., by use of a fleshing machine. D. W.

Manufacture of composition for cleaning and polishing leather and artificial leather. J. C. BLAIR-MCGUFFIE (B.P. 469,344, 1.4.36).—An emulsion of a derivative of $(CH_2OH)_2$ (e.g., the diglycol oleate), oleic acid, $C_2H_4Cl_2$, Pr^oOH , and aq. NH_3 is claimed. D. W.

XVI.—AGRICULTURE.

Criteria of horizons of soils of the podsol zone. J. S. JOFFE (Proc. Soil Sci. Soc. Amer., 1936, 1, 329—H (B).

332).—Generalised descriptions of podsol, grey-brown podsollic, and brown forest soils are given. A. M.

Mechanical analysis and soil texture. T. M. SHAW and L. T. ALEXANDER (Proc. Soil Sci. Soc. Amer., 1936, 1, 303—304).—Chemical analyses show that coarse clay (2—5 μ .) is more closely related to silt (50—5 μ .) than to fine clay (<2 μ .). This agrees with field identification and conforms to the international procedure. A. M.

Moisture content fluctuations on irrigated soils in South Australia. A. L. TISDALL (J. Austral. Inst. Agric. Sci., 1937, 3, 162—166).—Soil moisture of three sandy loams reached a max. at 2—3 ft. below the surface, and showed progressive decrease as the season advanced. L. D. G.

Determination of ferrous iron in soil solutions : effect of light on reduction of iron by citrate and 2 : 2'-dipyridyl. V. IGNATIEFF (J.S.C.I., 1937, 56, 407—410).—An adaptation of the dipyridyl (I) method is described. $AlCl_3$ decolorises soil solutions and stabilises Fe^{II} . Reduction of Fe^{III} by glucose, citrate, and (I) is accelerated by blue light. A. G. P.

Determination of ferric and ferrous iron in soils washed with effluent water. I. I. GANTIMUROV (J. Appl. Chem. Russ., 1937, 10, 1504—1513).—The intensity of reducing processes in soils is derived from the ratio of Fe^{II} to Fe^{III} in $N-H_2SO_4$ extracts of the soil. R. T.

Results from Cunninghamella plaque tests for available phosphorus in calcareous soils. H. W. REUSZER (Proc. Soil Sci. Soc. Amer., 1937, 1, 197—204).—The p_H range of the soils was 7.7—8.2 and the optimum H_2O content 45—50% of the H_2O -holding capacity. Additions of P_2O_5 to field soils gave significant changes in colony diameter. Storage of soil and summer or autumn sampling showed little difference. The method agreed closely with field tests for P on soils differing widely in available P. On soils differing less widely the agreement was less pronounced and the plaque method agreed more closely with the chemical method. Sugar beet was the crop studied. A. M.

Calcium relationships and base-exchange properties of forest soils. R. F. CHANDLER (Proc. Soil Sci. Soc. Amer., 1936, 1, 353).—Tree distribution and soil type are related, but there is no evidence to indicate that the species vary in their Ca requirements. The exchangeable-base content of the A-horizon under various growths differs greatly from that on open land, being much higher under white and red cedar and white ash and much lower under hemlock. A. M.

Variant forms of Rhizobium (root-nodule bacteria) in relation to soil-calcium. W. A. ALBRECHT and T. M. MCCALLA (Proc. Soil Sci. Soc. Amer., 1937, 1, 217).—A liquid colloid medium containing the necessary mineral constituents absorbed on the clay complex, with and without Ca at the same p_H , was used for growing four transfers of normal and variant forms of lucerne and soya-bean cultures. Results show that legume bacteria require Ca for good growth, whilst for best nodulation the host plant must

have Ca. The bacteria may receive much of their Ca from the host plant. A. M.

Significance of oxidation-reduction equilibrium in soil-fertility problems. L. G. WILLIS (Proc. Soil Sci. Soc. Amer., 1936, 1, 291—297).—Mineral deficiencies are not necessarily nutritional. Cu may replace K in the manuring of gladiolus and Cu and Mn are interchangeable in cotton experiments. With soya beans on acid soils Cu was beneficial and SiO_2 injurious. SiO_2 is beneficial on alkaline soils.

A. M.

Availability of phosphorus and potash and their influence on vegetable crop production and fertiliser practices on coastal plain soils. J. B. HESTER, R. K. CAROLUS, and J. M. BLUME (Proc. Soil Sci. Soc. Amer., 1936, 1, 233—241).—The soils have a great P-fixing capacity and crops may still respond to very high applications of P. With K there is a definite optimum val. Plot trials showed beneficial effect of K and P on potatoes, beets, and spring spinach. When rainfall was < normal, there is either a small response or negative results are obtained.

A. M.

Fertilised check plots. J. E. METZGER (Proc. Soil Sci. Soc. Amer., 1936, 1, 261—264).—These measure the yield response of test plots more accurately than "untreated" plots. Addition of CaO and excess of P has little effect on potato yield compared with standard farming treatment.

A. M.

Laboratory methods for evaluating the fertiliser requirements of soils. G. BARBIER (Bull. Assoc. Chim. Sucr., 1937, 54, 538—545).—Various types of methods at present available are reviewed. With soils similar in type, and under similar climatic conditions, for which statistical data are available, all the methods may prove useful, but they are much less satisfactory in comparing soils of different types. None of the methods is conspicuously superior to the others, and for practical purposes analysis of the soil is most to be recommended.

J. H. L.

Value of added-water data in testing fertiliser requirements of soil. J. E. CHAPMAN (Proc. Soil Sci. Soc. Amer., 1936, 1, 259—260).—Pot trials should be watered when each pot has dried down to the same moisture content irrespective of lapse of time. Increased yield of dry matter is accompanied by a decrease in the H_2O requirement of plants.

A. M.

Relative effect of different superphosphates on nitrogen fixation in cow manure. A. R. MIDGLEY (Proc. Soil Sci. Soc. Amer., 1936, 1, 299—301).—Approx. 50% of the total N in fresh cow manure is converted into NH_3 . Loss by volatilisation may be prevented by addition of superphosphate, which acts in proportion to its CaSO_4 content. The phosphate should be mixed with the manure before fermentation.

A. M.

Most favourable period for cutting hay in Sweden. N. HANSSON (Bied. Zentr. [Tierernähr.], 1936, A, 8, 499—508).—The composition and nutritive val. of hay in various stages of growth are recorded.

A. G. P.

Chemical weed killers. III. Relative toxicity of several chemicals to perennials under field

conditions. W. H. COOK, T. K. PAVLYCHENKO, J. M. MANSON, and P. GARROW. IV. Relative toxicities and loci of absorption of selected chemicals applied to perennials. W. H. COOK (Canad. J. Res., 1937, 15, C, 442—449, 451—460; cf. B., 1937, 1388).—III. Effective weed killers are classified into three groups according to toxicity: (i) NaClO_3 , (ii) $\text{Ba}(\text{ClO}_3)_2$, As_2O_5 , (iii) NH_4CNS , Na_3AsO_3 . The relative toxicity of the groups is 1 : 1.5 : >2.

IV. Among 12 compounds examined for treatment of perennial weeds, NaClO_3 and HClO_3 gave best results. NaSeO_3 , NH_4SCN , $\text{Na}_2\text{Cr}_2\text{O}_7$, and Na_3AsO_3 were also effective at relatively higher concns. Destruction of perennials depends largely on the action of poisons *via* the soil. Inefficiency of many substances which are highly injurious to foliage are attributable to dilution or detoxication in soil.

A. G. P.

Skeleton weed. Control in marginal wheat areas. K. G. CARN (Agric. Gaz. New South Wales, 1936, 47, 665—667).—Spraying with NaClO_3 gave satisfactory results. Addition of glue (1 oz. per 4 gals. of spray) improved efficiency in dry periods.

A. G. P.

Warm-water treatment of delicate wheat grains against *Ustilago tritici*. A. PEIT (Compt. rend. Acad. Agric. France, 1937, 23, 672—678).—Immersion of the infected grains in H_2O at about 50° for varying times proved more effective than many chemical treatments in destroying the fungus.

A. W. M.

Biology of the halophytes. III. Distribution, production, and sodium chloride content of plants in relation to the salt concentration of the substrate. E. SCHRATZ (Jahrb. wiss. Bot., 1936, 83, 133—189; cf. A., 1935, 671).—The distribution of plant species in salt-marsh soils is examined. Differences in NaCl contents of plants are influenced more by the [NaCl] of the soil- H_2O than by any characteristics of species.

A. G. P.

Effect of chlorides and sulphates on the mineral nutrition of the plant. E. DEMOUSSY and G. BARBIER (Compt. rend. Acad. Agric. France, 1937, 23, 699—706).—When increasing applications of SO_4^{--} and Cl^- fertilisers are added to wheat and sugar beet, a fixed amount of SO_4^{--} , but increasing amounts of Cl^- , are absorbed by the plant. The excess of SO_4^{--} in the soil is harmless, but the excess of Cl^- may be injurious. Large dressings of Cl^- fertilisers tend to increase the H_2O content of sugar beet. If seed and fertiliser are sown together the Cl^- content of the fertiliser should be smaller than when applied before sowing.

A. W. M.

Influence of boron on the nitrate metabolism [of plants]. E. W. SCHMIDT (Ber. deut. bot. Ges., 1937, 55, 356—361).—Treatment of barley seedlings with borax diminished their growth, N intake, and the amount of NO_3^- and chlorophyll per g. of leaf. B disturbs the N metabolism of plants.

A. G. P.

Boron in agriculture. R. W. G. DENNIS and D. G. O'BRIEN (West Scot. Agric. Coll. [Plant Husbandry] Res. Bull., 1937, No. 5, 98 pp.).—A review.

A. G. P.

Calcium and boron contents of apples as related to the incidence of blotchy cork. W. A. DE LONG (Plant Physiol., 1937, 12, 553—556).—Blotchy cork is associated with low Ca contents in the fruit rather than with deficiency of B. The Ca and B contents of fruit are not closely related. A. G. P.

Devernalisation of spring rye by anaërobic conditions and reveralisation by low temperature. F. G. GREGORY and O. N. PURVIS (Nature, 1937, 140, 547; cf. B., 1937, 167).—Cold-treated (vernalised) spring rye grains, imbibed in H₂O and kept in an atm. of N₂ at 20°, survive for periods >3 weeks and become devernalised, as shown by a marked increase in the leaf no. and in time of flowering. Spring rye partly devernalised by anaërobic conditions can again be vernalised by exposure in air to 1°. L. S. T.

Tuberisation of the Colorado wild potato as affected by X-irradiation. E. L. JOHNSON (Plant Physiol., 1937, 12, 547—551).—Yields were increased by X-irradiation (1500 r.) of sprouted but not of unspouted seed tubers. A. G. P.

Factors affecting cold-resistance in plants. S. DUNN (Plant Physiol., 1937, 12, 519—526).—Variation in hardiness in individual plants of a uniformly treated group was considerable. Growth at different levels of soil-H₂O, K, P, or N supply did not affect this variation. Low growth temp. had no influence on individual variation in hardiness of potatoes and cabbage, but induced greater survival from freezing than did growth at higher temp. The hardiness of successions of vegetatively propagated *Bryophyllum* and Jerusalem artichoke persisted for a time, but gradually returned to the original condition. A. G. P.

Liming experiments with potatoes, 1936. J. B. HESTER (Amer. Potato J., 1936, 13, 339—342).—The efficiency of various liming materials is compared. Frequent light dressings are preferable to heavier ones made at longer intervals. The latter favoured scab infestation. A. G. P.

Changes in use of potato fertiliser. B. E. BROWN (Amer. Potato J., 1936, 13, 327—339).—A review. A. G. P.

Fertiliser placement for potatoes. B. E. BROWN and G. A. CUMINGS (Amer. Potato J., 1936, 13, 269—272).—Best results were obtained by drilling fertilisers in narrow bands 2 in. on each side of the row and on a level with or slightly below the seed. A. G. P.

Potato-sprout emergence as related to fertiliser placement. G. V. C. HOUGHLAND (Amer. Potato J., 1936, 13, 343—346).—Side placement of fertilisers at a distance of 2—4 in. from, and on a level with or 2 in. below, the seed hastened sprouting. Fertiliser placed 1 in. from the seed retarded sprouting. The final yields were not substantially different as a result of these treatments. A. G. P.

Causes of blackening in cooked potatoes. W. E. TOTTINGHAM, R. NAGY, and A. F. ROSS (Amer. Potato J., 1936, 13, 297—309).—Blackening is associated with higher % N in the dry matter of the

tubers, high proportions of NH₂-acids (notably tyrosine), and greater ease of decomp. of protein by autolysis and by 3% aq. NaOH. Blackening was more pronounced in potatoes grown in soil having only moderate supplies of available K, but was not appreciably affected by the stage of maturity of tubers at harvest or by storage at relatively high temp. with restricted ventilation. Sap from potatoes which blackened on cooking was more than normally active in oxidising tyrosine. A. G. P.

Feeding and utilisation of sucrose solutions by the potato flea-beetle and fall web worm. D. O. WOLFENBARGER (J. Econ. Entom., 1936, 29, 586—589).—A method of feeding insects in toxicity tests is described. Among inorg. insecticides examined, BaSiF₆ showed the highest toxicity. A. G. P.

Tests of pyrethrum, derris, and nicotine mixtures against cabbage worms. H. C. HUCKETT (J. Econ. Entom., 1936, 29, 575—580).—The efficiency of various mixed preps. against *Pieris rapæ*, L., *Autographa brassicæ*, Riley, and *Mamestra picta*, Harris, is recorded. A. G. P.

Nitrogen chloride as a fumigant. R. S. WOLGUM and H. C. LEWIS (J. Econ. Entom., 1936, 29, 631—632).—A concn. of 1.4 mg. of NCl₃ per litre of air maintained for 4 hr., or 0.77 mg. per litre for 6 hr., was necessary to give a 100% kill of bean thrips when hibernating on oranges. A. G. P.

Effects of some inorganic salts on development and reproduction of the bean weevil, *Acanthoscelides obtectus*. R. J. BUSHNELL (J. Econ. Entom., 1936, 29, 509—514).—Appropriate concns. of aq. Fe₂(SO₄)₃ prolong the larval stage, and NaCl, NaNO₃, and KCl prolong the larval, prepupal, and pupal stages of the weevil, the action at 25° being > that at 30°. Although Na₂SO₄ is toxic to weevils, individuals reared on beans treated with Na₂SO₄ are normal. Univalent salts (NaCl and NaNO₃, but not NH₄Cl), similarly used, increase the metabolism of the insect in the early stages of growth. Insects reared on Fe₂(SO₄)₃-treated beans are heavier than controls. Salts causing a decrease in wt. of the weevil also decreased the no. of offspring obtained. A. G. P.

Dust treatments for protecting beans from the bean weevil. H. O. DEAY (J. Econ. Entom., 1936, 29, 498—501).—Proprietary clays, Dutox (BaSiF₆), and talc gave excellent protection. Ca(OH)₂, coal and wood ashes were somewhat less effective. The efficiency of non-poisonous dusts was directly related to their adhesiveness. A. G. P.

Barium carbonate for [control of] the bean beetle. L. M. PEARIS (J. Econ. Entom., 1936, 29, 584—585).—The insecticidal val. of BaCO₃ approaches that of standard materials, but its adhesiveness is poor. A. G. P.

Magnesium sulphate valueless as a control for the bean beetle. N. F. HOWARD (Science, 1937, 86, 286—287).—Field experiments show this to be the case (cf. B., 1937, 826). L. S. T.

Magnesium sulphate—an unsatisfactory substitute for arsenicals in grasshopper baits.

R. C. SMITH (Science, 1937, 86, 226—228).—The results given of field tests with $MgSO_4$ baits compared with standard baits demonstrate the ineffectiveness of the former (cf. B., 1937, 826). L. S. T.

Derris as a control for the pea aphid. J. E. DUDLEY, jun., T. E. BRONSON, and F. E. CARROLL (J. Econ. Entom., 1936, 29, 501—508).—Sprays prepared with powdered derris root and a wetting and spreading agent gave almost complete control of the aphid, and if applied prior to the infestation protected the plants from serious damage. A. G. P.

Photoperiodic after-effect [in plant growth]. R. H. STOUGHTON and D. R. HOLE (Nature, 1937, 140, 808).—Exposure of *Tithonia speciosa* to short days during the early stage of growth and afterwards to long days markedly accelerates flowering. This is accompanied by a change in the entire habit of the plants. L. S. T.

Tar oil and lubricating oil sprays in relation to rosy-aphid control and to winter-injured trees. F. Z. HARTZELL (J. Econ. Entom., 1937, 29, 556—561).—Comparative trials are recorded of lubricating oil, creosote oil, cresylic acid, and water-gas tar oil when used alone, mixed, and in conjunction with nicotine sulphate. Applications are made before buds have reached the "silver-tip" stage. A. G. P.

Control of juniper web-worm, *Dichomeris (Ysolophus) marginellus*, Fab. M. G. FARLEMAN (J. Econ. Entom., 1936, 29, 493—494).—Nicotine sulphate (1 in 400) used with a sulphonated higher alcohol spreader gave a high level of control without injury to the trees. A. G. P.

Arsenical [insecticide] substitutes. II. Relations between molecular structure and toxicity of organic compounds to the silkworm. J. M. GINSBURG and C. J. CAVALLITO (J. Econ. Entom., 1936, 29, 856—859; cf. B., 1935, 968).—Among numerous substances examined those containing both NH_2 and S-groups tend to show high toxicity. A. G. P.

Toxic action of nictines, nornictines, and anabasine on *Aphis rumicis*, L. C. H. RICHARDSON, L. C. CRAIG, and T. R. HANSBERRY (J. Econ. Entom., 1936, 29, 850—855).—The order of toxicity to adult aphid was: anabasine > *l*- β -nicotine = *dl*- β -nornictine > *dl*- β -nicotine > *dl*- α -nicotine = *dl*- α -nornictine. The presence of a Me group on the pyrrolidine-N of a pyridylpyrrolidine is not essential for conferring toxic properties. Compounds linked in the β -position of the C_5H_5N nucleus are the most toxic in the series. *dl*-Nicotine has approx. 50% of the toxicity of the natural product, the *l*-isomeride being the more active. A. G. P.

Effectiveness of low concentrations of nicotine in combination with other materials against black pecan aphid. G. F. MOZNETTE (J. Econ. Entom., 1936, 29, 970—972).—The aphid is controlled by nicotine (1 in 4000) when used in combination with Bordeaux mixture, white oil emulsion (0.5%), or K oleate soap. Variations in the amount, η , or un-sulphonatable fraction of the oil had little influence

on the efficiency of the combined spray. Fish oil and soap prepared from it, lignin pitch, Ca caseinate, and pine-tar oil were inferior as nicotine supplements. A. G. P.

Vapours for control of blue mould of tobacco. L. F. MANDELSON (Queensland Agric. J., 1936, 45, 534—540).—Effective control of the disease in seedlings was obtained by fumigation with C_6H_6 -petroleum distillate or C_6H_6 -PhMe-petroleum in cold frames or in tents. A. G. P.

Harvesting, drying, and sampling derris root. C. D. V. GEORGI (Malay. Agric. J., 1937, 25, 425—429).—It is proposed to divide the roots into thick and thin categories when harvesting, to dry each kind separately at about 50°, and to bale proportionate amounts in each bale. 25 samples from 497 bales thus prepared from one estate had 21.14—27.33% of total extractives, including 5.62—8.85% of rotenone, the % of rotenone in the extract varying from 26.2 to 35.4%. R. S. C.

Microbiology of tea. II. Influence of tea extract on soil micro-organisms. A. ITANO and Y. TSUJI (Ber. Ohara Inst. landw. Forsch., 1937, 7, 491—500).—The action of aq. extracts of tea on *B. subtilis*, *Azotobacter*, yeasts, and *Aspergillus niger* is α the tannin content of the extracts. Yeasts were stimulated by the extracts. A. G. P.

Larvicides to control fruit tree leaf-roller, with special reference to lead arsenate and supplements. P. J. CHAPMAN and R. W. DEAN (J. Econ. Entom., 1936, 29, 561—570).—Dormant oil and Pb arsenate (I) sprays were almost equally effective, a combination of both giving best results. Oil causes some damage to buds. Among larvicides examined only CaO-S produced a definite increase in yield. CaO-S-(I) was inferior to wettable S-(I). $Cu(CN)_2$ and (I) caused russetting of fruit, and (I)-rosin fish-oil soap damaged foliage. No injury resulted from use of combinations of mineral oil with $Cu NH_4$ silicate or wettable S. A. G. P.

Effect of orchard practices on codling-moth and leaf-hopper parasitism. B. F. DRIGGERS and B. B. PEPPER (J. Econ. Entom., 1936, 29, 477—480).—Parasitism of codling moth by *Trichogramma* species was less in heavily sprayed than in unsprayed orchards. A. G. P.

Halowax (chlorinated naphthalene) as an ovicide for codling moth and oriental fruit moth. E. P. BREAKEY and A. C. MILLER (J. Econ. Entom., 1936, 29, 820—826).—Best results were obtained by use of an emulsion prepared with a solution (1 in 7) of Halowax in white petroleum oil ($\eta = 80$ sec. Saybolt) and a sulphonated fatty alcohol as emulsifier. The efficiency of the spray was influenced by the proportion of emulsifier used. A. G. P.

Codling-moth spraying experiments in Pennsylvania, 1935. H. N. WORTHLEY (J. Econ. Entom., 1936, 29, 527—532).—Results of field trials are recorded. The use of four first-brood cover sprays of Pb arsenate (I) is recommended, the first two to contain fish oil and the last two nicotine. Where second-brood sprays are necessary summer oil-nicotine sulphate is a safe substitute for (I). A. G. P.

Insecticidal efficiency of some contact sprays against codling-moth eggs. W. S. HOUGH and R. N. JEFFERSON (J. Econ. Entom., 1936, 29, 537—541).—Oil-Bordeaux mixture combinations gave a high level of control. At similar concns. the efficiency of vegetable oils was < that of mineral oils in ovicidal tests. A. G. P.

Laboratory tests of phenothiazine against codling moth. E. H. SIEGLER, F. MUNGER, and L. E. SMITH (J. Econ. Entom., 1936, 29, 532—537).—The initial toxicity of purified phenothiazine to codling-moth larvæ is > that of the commercial product and < that of Pb arsenate. A. G. P.

Control of apple flea-weevil. J. S. HOUSER and R. B. NEISWANDER (J. Econ. Entom., 1936, 29, 481—482).—Good control was obtained with a proprietary BaSiF₆ prep. supplemented with S and a spreader. A. G. P.

Apple maggot. P. GARMAN (J. Econ. Entom., 1936, 29, 542—544).—Oviposition by *Phagoletis pomonella*, W., was diminished by dusting trees with CaO, talc, or S. The toxicity of cryolite to adult flies was almost = that of Pb arsenate. A. G. P.

Comstock's mealy-bug as an apple pest. A. M. WOODSIDE (J. Econ. Entom., 1936, 29, 544—546).—The insect was controlled by dormant spraying of the scraped trees with tar-petroleum oil sprays. Nicotine showed promise as a first-brood spray. A. G. P.

Derris insecticides. VI. Summer control of European red mite on apple with derris and neutral wetting agents. R. E. HEAL (J. Econ. Entom., 1936, 29, 550—556).—Derris sprays give effective control and may be safely applied to foliage on which residues of Pb arsenate and S still remain. A. G. P.

Potentialities of eradicant fungicides for combatting apple scab and some other plant diseases. G. W. KEITT and D. H. PALMITER (J. Agric. Res., 1937, 55, 397—437).—Spraying the trees after harvest with various As preps. (notably Bordeaux mixture-Pb arsenate) reduced scab infection in the following season. Spring treatment of fallen leaves killed the ascocarps of *V. inequalis*. The toxicity of CaO-CuSO₄-Pb arsenate preps. may be varied over a wide range by altering the proportions of the constituents. The mixtures liberate sol. matter which diffuses to a considerable distance from the solid particles in both acid and alkaline media and is effective against fungal fruiting bodies at the surface of leaves or near the permeable areas of invaded tissue. A. G. P.

Stickers for derris applied as an insecticidal spray. L. D. GOODHUE and W. E. FLEMING (J. Econ. Entom., 1936, 29, 580—583).—Residues from the manufacture of resin, emulsified with (NH₄)₂CO₃, gave best results. A. G. P.

Relative toxicity of some optically active and inactive rotenone derivatives to culicine mosquito larvæ. D. E. FINK and H. L. HALLER (J. Econ. Entom., 1936, 29, 594—598).—Optically active forms of dihydrodeguelin and isorotenone exhibited greater toxicity than did the corresponding

inactive compounds. The bearing of these observations on the apparent variability in efficiency of derris extracts is discussed. A. G. P.

Effect of calcium cyanamide on the evolution of the Colorado beetle. DELEUZE and DUSSY (Compt. rend. Acad. Agric. France, 1937, 23, 666—672).—Spring dressings of "oily" CaCN₂ inhibit the appearance of the beetles from the soil, the action being most intense after 8 days. Hoeing and ridging tend to disturb the homogeneity of the application and give poorer results. A. W. M.

Toxicity of copper-lime-arsenic mixtures to certain phytopathogenic fungi grown on malt-agar plates. D. H. PALMITER and G. W. KEITT (J. Agric. Res., 1937, 55, 439—451).—Tests of various preps. with 18 different organisms are recorded. The toxicity of CuSO₄-CaO-arsenite mixtures was generally > the added toxicities of the components. A. G. P.

Comparative methods of removing lead loads resulting from a heavy first-brood oil-lead schedule. C. L. BURKHOLDER and O. W. FORD (J. Econ. Entom., 1936, 29, 827—830).—Comparison is made of three types of washing machines using varying [HCl], with and without a wetting agent. A. G. P.

Insecticidal activity of aliphatic thiocyanates. III. Red spiders and mites. D. F. MURPHY (J. Econ. Entom., 1936, 29, 606—611; cf. B., 1933, 647).—OBu·[CH₂]₂·O·[CH₂]₂·CNS emulsion gives good control of *Tetranychus telarius* and *Paratetranychus pilosus*, and may be used in combination with S or CaO-S in double-purpose sprays. A. G. P.

Possible substitutes for hydrocyanic acid in fumigation of Californian red scale. H. L. CUPPLES, H. R. YUST, and J. HILEY (J. Econ. Entom., 1936, 29, 611—618).—Trials with numerous org. fumigants are recorded. Thiocyanates and thiocarbimides are toxic to the scale at moderate concns., the former being the less injurious to foliage. MeSCN is as effective as HCN, mol. for mol. Among thiocyanates toxicity did not increase with mol. wt. A. G. P.

Chlorine treatment of honey combs. J. D. HITCHCOCK (J. Econ. Entom., 1936, 29, 895—904).—Cl₂ gives satisfactory sterilisation, but has deleterious effects on combs and frame wires. A. G. P.

Biology and control of the large round-worm of fowls, *Ascaridia galli*, (Schrank 1788), Freeborn 1923. F. H. S. ROBERTS (Queensland Agric. J., 1936, 46, 38—50, 173—191, 328—356, 468—479, 586—601; 47, 8—17; cf. B., 1937, 714).—Among numerous substances examined, CCl₄, administered in capsules or admixed with liquid paraffin, gave best results. A. G. P.

Fertilisers from alunite. Utilisation of Cu rocks etc. Determining added P in oils.—See VII. Determining ice-H₂O relation [in soils etc.].—See XI. Pyrethrum flowers. Rotenone.—See XX.

See also A., II, 511, **Constituents of pyrethrum flowers.** III, 489, **Tobacco-mosaic virus.** 499—500, **N excretion by leguminous plants.**

PATENTS.

(A) Fertiliser and process of making same. (B) Fertiliser base material. A. G. STILLWELL (U.S.P. 2,049,524—5, 4.8.36. Appl., [A] 18.8.33; [B] 30.3.34).—(A) Waste liquor from sugar manufacture, from molasses, or from EtOH manufacture is conc. to a H₂O content of 47—53% and treated in a steam-jacketed mixer with superphosphate and (NH₄)₂SO₄. When thoroughly mixed, NH₃ is added and the temp. adjusted to 71.1—85° until the mixture becomes mealy. The product is dehydrated mechanically or in air, and may be ground. The stable, non-hygroscopic, final material contains, e.g., H₂O-sol. matter 40, N 3, K 3, and available H₃PO₄ 8%. (B) Similar waste liquor is conc. to d 1.28—1.41 and mixed at 55—100° with sufficient CaCN₂ to convert it into a hard, non-hygroscopic, granular mass which may be ground. Approx. 50% of the added N is rendered insol., but 90—95% of this insol. N remains available (neutral KMnO₄ method). The amount of CaCN₂ added, and hence the N content of the product, will depend on the degree of concn. of the waste liquor. The product may be mixed with other fertiliser materials. I. A. P.

Production of superphosphate fertiliser. L. H. FACER (U.S.P. 2,061,567, 24.11.36. Appl., 2.2.34).—For the eventual production of a granular and free-running product, methods of casting a reacting mixture of phosphate rock and H₂SO₄ with or without addition of materials containing K and/or N are described (43 claims). The dens have removable walls which are loosened before the end of the reaction, but the block itself is left undisturbed until no heat is being generated and it has cooled to a substantial extent. B. M. V.

Treatment of seeds, bulbs, tubers, and roots. G. E. HEYL (B.P. 470,843 and 470,910, 19.11.35).—The seeds etc. are coated with preserved latex containing (A) metallic oxide or oxides, or a dye and/or ZnCl₂ or SnCl₂, to alter the colour of the flowers produced, (B) suitable essential oils (pinene, limonene) to impart a preselected taste and/or odour to the fruits. The use of turpentine is excluded. E. H. S.

Prevention of injury to frosted vegetation. C. H. RUTHERFORD (U.S.P. 2,057,316, 13.10.36. Appl., 27.4.36).—Frosted citrus trees, e.g., are sprayed from overhead with H₂O, preferably containing sol. N compounds [e.g., (NH₄)₂SO₄ 1, Ca(NO₃)₂ 2, NH₄H₂PO₄ 1 lb. per 1000 gals.], the spraying being begun before sunrise and continued until the sun has warmed up the orchard. I. C. R.

Manufacture of insecticide. W. CARTER (U.S.P. 2,056,121, 29.9.36. Appl., 21.5.34).—A spraying insecticide, harmless to plants, is obtained by emulsifying a Diesel fuel oil (10 pts.) in H₂O (10 pts.) by means of colloidal clay (bentonite, 1 pt.) and high-speed agitation, and then diluting the resulting emulsion (1 pt.) with an aq. liquid (100 pts.) containing a dissolved substance producing acid ions (e.g., H₂SO₄, citric acid, or salts of these). H. C. M.

Motor fuel.—See II.

XVII.—SUGARS; STARCHES; GUMS.

p_H determination in the sugar-cane industry. A. D. L. RODRIGUES (Riv. Chim. pura appl., 1936, [iii], 11, 154—162).—Electrometric determination of the not too greatly diluted solutions as described by Barbandy (B., 1928, 383) is recommended and the variation of p_H of unbuffered solutions on dilution is recorded. F. R. G.

Utilising spruce chippings as material for saccharification. T. PLOETZ (Papier-Fabr., 1937, 35, 439—440).—The yield of sugar from spruce-waste chippings depends largely on their content of bark, since bark is entirely unproductive of sugar. The best results are obtained from the cambium wood, which is relatively little lignified. The sugar yield from wood is not always a direct indication of the vol. of EtOH which may be derived from it, because of the presence of variable quantities of unfermentable substances (pentoses etc.). D. A. C.

Extraction of [polysaccharides from] Jerusalem artichoke juices in an experimental diffusion battery. M. J. PROFFITT, J. A. BOGAN, and R. F. JACKSON (J. Res. Nat. Bur. Stand., 1937, 19, 263—285).—Detailed extraction data are recorded for the diffusion battery described previously (B., 1936, 71). F. L. U.

Pulp from sugar-cane stalks. Starches for paper industry.—See V. Determining ice-H₂O relation [in sugar solutions].—See XI. Effect of Cl⁻ and SO₄²⁻ on [sugar-beet] plants. *Cunninghamella* plague tests [on sugar beet].—See XVI. Yeast growth of beet molasses.—See XVIII. Determining sugars in grain etc. Examination of [Dutch] foodstuffs.—See XIX. Tragacanth gum.—See XX.

See also A., II, 487, So-called "sol. starch."

PATENTS.

Sugar-crystallising and like apparatus. J. MILLER (B.P. 469,771, 4.2.36).—A stationary vessel is provided with a rotating, cooled stirrer comprising at least two tube coils of opposite hand on a hollow shaft constructed of standard rolled sections and plates. B. M. V.

Potato-starch extracting machine. C. K. BRANDSTROM (U.S.P. 2,058,560, 27.10.36. Appl., 10.7.35).—A drum-type apparatus with a common axis to all drums comprises stages of washing and grinding of potatoes, straining of starch through a screen, and drying it on another screen with air blasts. B. M. V.

Starch prep.—See VI. Fertilisers.—See XVI. EtOH from carbohydrates.—See XVIII.

XVIII.—FERMENTATION INDUSTRIES.

Practical aspects of some recent developments in brewing bacteriology. J. L. SHIMWELL (J. Inst. Brew., 1937, 43, 450—456).—The difference in behaviour towards hop antiseptic of Gram-positive and Gram-negative bacteria, the associated effect of varying acidity, and the importance of the initial

stationary phase and the effect of this on the reliability of the forcing tray test are shown. Conditions favouring the attainment of bacterial stability in beer include a high hop rate, an initial p_H as low as possible, and a min. concn. of fermentable carbohydrates; success will not necessarily be obtained, however, even if these conditions are satisfied. I. A. P.

[Yeast] growth-factor content of beet molasses. R. ILLIES (Z. Spiritusind., 1937, 60, 329—330, 338—339).—Synthetic media of composition simulating that of molasses solution are unfavourable for yeast development (aëration process), giving very low yields of yeast of variable baking quality, the yields in successive cultivations being markedly different. Molasses solutions (cleared with superphosphate, and with added N and P), however, give good yields of satisfactory baking quality, and the variations in successive cultivations are small. The content of growth factor in molasses is sufficiently great to ensure approx. normal development when 50% of the nutrients of synthetic media are replaced by their equiv. of molasses. Malt-germ extract added to molasses gives further improvement, the extract therefore containing some further growth-stimulating factor. I. A. P.

Biological acidification of yeast mashes. B. LAMPE and R. DEPLANQUE (Z. Spiritusind., 1937, 60, 317—318).—The acidification of distillery mashes is discussed, with special reference to the lactic acid process. Cooking of mashes favours acid production, but addition of such cooked material to mashes lowers the subsequent acid production by *Bact. Delbrücki*, since increased initial acidity has a depressing effect on further acid production. I. A. P.

Composition of the total nitrogen of various varieties of brewing barley, its changes during ripening and germination, and its significance for the degree of protein modification. III. Changes during germination, with especial reference to protein modification during malting. H. FINK and G. KUNISCH (Woch. Brau., 1937, 54, 365—368, 373—377, 381—384; cf. B., 1937, 1394).—During the germination of barley, hordein and glutelin are converted into salt-sol. materials at varying rates. Resynthesis of glutelin takes place in the embryo, the extent of this increasing with the germination period and the rapidity of development of the plumule. Resynthesis of hordein takes place only temporarily or not at all. The abs. increase in N in the developing embryo may correspond to a slight decrease in N when calc. to embryo dry-substance. Uninterrupted germination, after the first sharp rise in salt-sol. N, gives no further increase in this, a slow fall being eventually found. The salt-sol. N of malt is very dependent on that of the original barley, and accordingly the "protein modification" (wort N \times 100/total N) of malt is directly related to the total N and variety of the barley. Cutting of barley at the fully-ripe stage (Vollreife) is most favourable. I. A. P.

Staining the acrospires of malt. C. A. KLOSS (J. Inst. Brew., 1937, 43, 471).—Malt, even when under-modified, gives a blue-stained acrospire on

boiling in 2% aq. CuSO_4 for a few min., thereafter allowing to soak for $\frac{1}{2}$ hr. The test, which is given only after kilning, is of assistance when determining acrospire length. I. A. P.

Distinguishing the degree of curing of pale malt by its germinative capacity. P. KOLBACH and G. KUNISCH (Woch. Brau., 1937, 54, 341—345).—Possible methods of determining the intensity of curing are critically discussed, with special reference to a method based on germinative capacity (Uspulun-Nassbeize method; cf. B., 1937, 383). 37 commercial pale malt samples gave an average germinative capacity of 46% (total) and 23% (rootlet development). Rising curing temp. causes decrease in this val., there being for each initial moisture content a crit. temp. above which its reduction is rapid. Preliminary drying (P_2O_5 , H_2SO_4) at normal temp. reduces the sensitivity of germinative capacity to the curing temp. This capacity for pale malts is $>$ as previously supposed, and is influenced by the combined effect of initial moisture content, temp., and time of curing. Thus, the intensity of curing is not solely a function of temp., but is much influenced by moisture content. I. A. P.

Determination of the germinative capacity of barley during the maturation period. C. ENDERS and F. SCHNEEBAUER (Woch. Brau., 1937, 54, 353—355).—In addition to its rapidity of execution, the $\text{C}_6\text{H}_4(\text{NO}_2)_2$ method for determining germinative capacity has the advantage that, within a few days of harvesting, it gives results for this val. which are attained only by actual germination (Aubry) at the end of a varying protracted period of maturation. The effect of H_2O_2 -steeping in improving actual germination, and the probable mechanism of maturation changes, are discussed. I. A. P.

Effect of abundant aëration of fermenting wort. I. Increase of the yeast crop. H. FINK and F. JUST (Woch. Brau., 1937, 54, 349—352).—By suitable sterile aëration of the fermenting wort, the yeast crop was increased by approx. 40%, with no important modifications in the properties of the beer obtained, apart from a reduction in beer-N, which may be advantageous. Thus it appears possible to produce a large quantity of additional yeast, available for feeding purposes, at very little cost. It is emphasised, however, that beers other than the sample investigated may prove more sensitive to the increased aëration. I. A. P.

Avoidance of sedimentation in pasteurised caramel beers. I. JANENSCH (Woch. Brau., 1937, 54, 347).—The deposits examined consisted of dead yeast cells and, while spoiling the appearance, represented no deterioration of the beer. The trouble could be avoided by filtration or by treatment with materials assisting yeast separation. I. A. P.

Dematium pullulans as the cause of alterations in odour and flavour of caramel beers. I. JANENSCH (Woch. Brau., 1937, 54, 355).—Hard deposits in bottles, the beer in which developed a musty odour and flavour, were growths of this organism. After developing in emptied bottles and being difficult to remove, the growth had escaped the

bottle-washing, and so affected the beer of the next filling. I. A. P.

Significance of oxygen in the development of beer. H. LÜERS (Woch. Brau., 1937, 54, 389—394).—A lecture. I. A. P.

Charcoal[*-treated*] beer; a new substrate for sarcinæ and bacterial rods. R. HOLZHÄUSER, W. KOCHMANN, and C. W. NAUMANN (Woch. Brau., 1937, 54, 377).—Completely attenuated beer is freed from CO₂, filtered, shaken for 5—10 min. with 1% of active C, filtered bright, mixed with EtOH to give a total [EtOH] of 5—6%, and sterilised. The product, on which sarcinæ and rods can develop rapidly, has lost approx. 10% of its original extract materials and 45% of the original total N, and no turbidity is produced during sterilisation. I. A. P.

New type of beer-disease bacterium (*Achromobacter anaërobium*, sp. nov.) producing alcoholic fermentation of glucose. J. L. SHIMWELL (J. Inst. Brew., 1937, 43, 507—509).—The organism described was isolated from turbid beer of unpleasant odour and taste. It is anaërobic and Gram-negative, develops over a p_{H} range of <3.4 to >7.5, and is not checked by increasing the hop rate. Growth takes place only in presence of fermentable sugar, the vigorous fermentation of glucose producing EtOH and CO₂. The organism is regarded as the most dangerous beer-disease bacterium yet recorded. I. A. P.

Spectrophotometry of colouring matters of wines. I. Irpinian wines and the commoner artificial dyes. C. VIOLANTE and G. BEMPORAD (Annali Chim. Appl., 1937, 27, 399—406).—Spectrophotometric analysis indicates that the natural and artificial colouring matters may be clearly differentiated. The results for 13 wines are tabulated. I. A. P.

Evaluation of fusel oil. W. KILP and R. BUSE (Z. Spiritusind., 1937, 60, 305, 310, 312—313).—It is found impossible to shorten the usual fractional distillation method for the determination of C₅H₁₁OH by a preliminary dehydration of the sample, even if this is complete and EtOH also is removed. The presence of constituents other than EtOH and H₂O which affect the composition of the vapour still necessitates the examination of the individual fractions obtained in the distillation. I. A. P.

Fermentation of Cuban invert molasses in production of industrial alcohol. W. L. OWEN and T. S. CHEN (J. Chem. Eng. China, 1937, 4, 212—217).—The rate of fermentation of this molasses (Brix 83.8°, sucrose 35.02%, reducing sugars 41.62%) is retarded and the yield of EtOH decreased by addition of acid. Efficient fermentation requires the addition of three times the usual amount of (NH₄)₂SO₄ and also liberal amounts of phosphate. The presence of MgSO₄ is advantageous. E. H. S.

Manufacture of ethyl alcohol from crude batate. Acid hydrolysis and amylo-processes. R. NAKAZAWA, M. NAKANO, and K. KOBAYASI (J. Agric. Chem. Soc. Japan, 1937, 13, 815—828).—Addition of 10% of crude sugar molasses to crude batate mash which had been hydrolysed by dil.

HCl, and subsequent fermentation with *Sacch. robustus*, gave an 85% yield of EtOH. By the amylo-process, using *Rhizopus javanicus*, an 80% yield of EtOH (calc. on the original starch) was obtained. J. N. A.

Manufacture of ethyl alcohol from potatoes. I. Storage of potatoes. Changes during sprouting, and effects of treatments on sprouting. K. SATO, I. MARUTA, A. MATUMI, and M. MURAI (J. Agric. Chem. Soc. Japan, 1937, 13, 989—997, 998—1002).—The total sugar (glucose + sucrose) rose to a max. during March and April, and then decreased rapidly. Various treatments did not inhibit sprouting. J. N. A.

Distillation of mixtures of water and ethyl alcohol. P. VIDAL (Bull. Assoc. Chim. Sucr., 1937, 54, 489—505).—No simple formula relates x and y , the wt.-% of EtOH in the liquid and vapour phases. For vals. of x between 0 and 95.5 (the azeotropic point), however, $dy/dx = f(x)$ approximates closely to a hyperbola. Integrating and determining the consts. by experiment, the author obtains $y = 0.0116945x^2 - 1.95329x + 125.652\log(1 + x/4)$, which for $x = 0$ to 95.5 gives vals. of y between those of Sorel and Bergström. J. H. L.

Automatic distillation etc. columns.—See I. **Dry spent wash [of potato distilleries].**—See XIX.

See also A., III, 480, [Prep. of] tyramine oxidase. 481, [Prep. of] polyphenolases. 482, β -Amylase from ungerminated barley.

PATENTS.

Manufacture of yeast. S. JANSEN (U.S.P. 2,056,576, 6.10.36. Appl., 17.11.34. Nor., 20.2.30).—Propagation is carried out in wort contained in a vessel provided with circulation pipes with pumps, whereby the wort is circulated through an external system and returned either with splashing to the main body from above or by forcing upwards in or over the main body. The rate of flow allows the withdrawal and return of the whole vol. in <3 min. A large output of EtOH is obtained in addition to a satisfactory production of yeast. If desired, a closed vessel with adjustable air inlets in the cover may be used, allowing regulation of the ratio yeast:EtOH, or air may be blown or drawn into the vessel above the wort. I. A. P.

Production of alcohol and/or yeast by fermentation of liquids containing carbohydrate. N. V. INTERNAT. SUIKER EN ALCOHOL COMP. INTERNAT. SUGAR & ALCOHOL Co. "ISACO" (B.P. 469,300, 23.11.36. Ger., 22.11.35).—Fermentation is carried out in a trickle tower filled with, e.g., Raschig porcelain rings for wood-sugar fermentation, these being supported on a false bottom above a collecting chamber into which air may be passed. The liquid from the chamber passes to an attemperating container, whence it is pumped back to the top of the tower, whilst part of the liquid from the circulating pipe is led off for separation of the fermentation products. Fermentation for EtOH production occupies 7 hr., and for yeast production 2—3 hr. I. A. P.

Preparation of (A) soluble starch, (B) starch products. J. H. VAN DER MEULEN (U.S.P.

2,053,012—3, 1.9.36. [A, B] Appl., 2.5.34. [A] Ger., 5.5.33, [B] Austr., 6.5.33.—(A) Starch mixed with H₂O is treated with OCl' and/or OBr' with stirring, and thereafter is treated in an alkaline medium with a N-H compound [e.g., NH₂·CH₂·CH₂·OH, glycine, (CH₂·NH₂)₂, N₂H₄], preferably NH₃. The reaction proceeds at normal temp., and after a suitable interval (10—60 min., dependent on the actual procedure) the mixture is acidified, treated with NaHSO₃, and the starch filtered off, washed, and dried. (B) Without the use of NH₃, but using OBr', the treated starch yields after gelatinisation a paste-like gel which will not readily dry out. The OBr' may be partly replaced by OCl'. (A, B) The products are non-reducing, and their physical properties may be modified by varying the composition of the treatment mixture, including the alkali concn. I. A. P.

Compressing gas [in beer-pumping].—See I. Fertilisers.—See XVI. Dispensing beverages [beer].—See XIX.

XIX.—FOODS.

Rational method of determining sugars in grain, flour, and dough. W. IWANOWSKI and C. GRABOWSKA (Rocz. Chem., 1937, 17, 398—410).—The cereal products are extracted with a 3 : 1 mixture (by vol.) of 0.15N-Na₂CO₃ and 0.15N-NaHCO₃ in presence of a few drops of CHCl₃, and reducing sugars are determined by the usual methods in the filtrate. Under these conditions starch and proteins are not dissolved, destruction of sugars does not take place, and the action of enzymes and bacteria is inhibited. R. T.

Fumigation of flour mills with hydrocyanic acid gas. R. C. COTTON, H. D. YOUNG, and G. B. WAGNER (J. Econ. Entom., 1936, 29, 514—523).—The distribution of HCN after fumigation by various systems is examined; the efficiency of control of the confused flour beetle is recorded. A. G. P.

Storage of rice. XVI. Storage in concrete silos for five years. XVII. Comparison of hulled and unhulled rice in regard to changes in quality during storage in straw bags. M. KONDŌ and T. OKAMURA (Ber. Ohara Inst. landw. Forsch., 1937, 7, 471—481, 483—490; cf. B., 1937, 487).—XVI. Hulled and unhulled rice stored in hermetically sealed concrete silos or in tinned containers showed no appreciable deterioration in quality (η of rice paste, vitamin-B content) beyond a slight browning and a tendency towards diminished H₂O absorption and swelling capacity. The importance of thorough drying of the concrete walls of silos before filling is emphasised.

XVII. Unhulled rice was unattacked by insects during storage, but was slightly inferior to hulled rice in respect of vol.-wt., polishing loss, and odour. The germinating capacity of rice stored in straw bags diminished considerably after 1 year; fat, glucose, and dextrin contents fell slightly and catalase activity declined rapidly during storage. Hulled and unhulled samples were equally affected. The vitamin-B₁ content was the same after 2 years in hulled and unhulled material. A. G. P.

Magnesium in milk products. Determination by a micro-method. J. H. BUSHILL, L. H. LAMPITT, and D. F. FILMER (J.S.C.I., 1937, 56, 411—413T).—The material is ashed, dissolved in HCl, the Ca (if present) pptd. as CaC₂O₄ at p_H 3, the NH₄ salts and sol. oxalate are removed by ashing, the residue is dissolved in HCl, and the Mg pptd. as MgNH₄PO₄, the P of which is determined by a molybdate colorimetric method. Technique is described by which the Mg/P ratio in the MgNH₄PO₄ ppt. may be controlled. The error of the method is within $\pm 2\%$. Mg contents of various milk products are given.

Growth of *Streptococcus pyogenes* in milk at atmospheric temperatures. E. J. PULLINGER and A. E. KEMP (J. Hyg., 1937, 37, 527—538).—Rapid multiplication occurs in sterilised milk at 18—22°, and more slowly at 15°, but in raw and laboratory-pasteurised milk growth occurs only after 48—72 hr. storage. This is due to the reluctance of the organism to grow at room temp., the bacteriostatic action of milk, and the competition from readily-growing saprophytic organisms. W. L. D.

Ice milk. G. D. TURNBOW (Dairy Ind., 1937, 2, 409—411).—Milk containing fat ≤ 4 and total solids $\leq 13\%$ is frozen as with ice cream after addition of edible stabiliser $> 0.6\%$. The manufacture and composition of the commercial article are described. W. L. D.

Utilisation of whey. KIEFERLE and W. LIEBSCHER (Dairy Ind., 1937, 2, 376—378).—The feeding val. of cow and sheep whey and the prep. of cheese products, whey-albumin, and bran are given. Methods of drying whey are compared. W. L. D.

Colour of butter and vitamin-A. K. G. WECKEL (Nat. Butter and Cheese J., 1937, 28, No. 17, 28—31).—Seasonal variations in the carotene and -A content of butter show carotene to be highest from May to August and -A from May to November. Forage plants differ in the amount of total -A activity conferred to butter, sweet clover being highest and timothy and meadow grass lowest. W. L. D.

Stabilisation of butter against oxidised flavours. V. L. KOENIG (Nat. Butter and Cheese J., 1937, 28, No. 15, 26—30).—Wrapping in avensid parchment (sized with oat flour) or mixing butter with 0.06% of avenol (C₆H₁₄ extract of oat flour) prevented rancidity for ≤ 11 weeks when butter was stored at 10°, and for ≤ 16 weeks when stored at -18°. W. L. D.

Delaying oxidative changes in butter. C. D. DAHLE and D. V. JOSEPHSON (Nat. Butter and Cheese J., 1937, 28, No. 18, 18—21).—By adding oat flour to cream at the rate of 1% of the wt. of fat before pasteurising, the rate of oxidation of butter is retarded. This process is commercially undesirable owing to sediment and starch in the butter. Addition of an aq. extract of oat flour to sweet or sour cream before pasteurisation improves the keeping quality of the butter. The aq. extract of a wt. of oat flour equiv. to 1% of the fat in cream amply protected butter stored for 2 months at 7°. W. L. D.

Improving the keeping quality of butter with treated parchment. C. D. DAHLE and D. V.

JOSEPHSON (Nat. Butter and Cheese J., 1937, 28, No. 14, 6—7).—Butter wrapped in vegetable parchment treated with a size of oat flour did not develop a surface oxidised flavour as readily as that wrapped in ordinary parchment, when stored at 7° for 6 weeks or at -8° for 6 months. W. L. D.

Importance of the phytosteryl acetate test in detecting hydrogenated fats in ghee. K. N. BAGCHI and N. S. MAZUMDAR (Indian J. Med. Res., 1936, 24, 233—237).—The technique of the test is described in detail. The presence of hydrogenated fats is indicated by the appearance of brown resinous material after both saponification and acetylation, the absence of phytosteryl acetate crystals from the saponified material, the presence of amorphous material therein, and the low m.p. of the later fractions from the crystallisation of the acetylated sterols. The digitonin method does not allow the detection of hydrocarbons. R. N. C.

Digestion of reconstituted cream. G. A. HARTWELL (J.S.C.I., 1937, 56, 442—444t).—The rate of digestion of the fat in reconstituted cream is more rapid than that in different samples of dairy cream. The use of various samples of butter in making the cream, pasteurising, and keeping overnight in a refrigerator had no effect on the rate of digestion, whereas the temp. at which the cream was made was an important factor.

Value of [cream] starters. W. L. SLATTER (Nat. Butter and Cheese J., 1937, 28, No. 17, 38—39).—Cream starters are best made from whole milk of high content of fat and solids-not-fat. Milk must be pasteurised at 80—90° for 1 hr. and cooled to 20° for propagation. Ripening should reach an acidity of 0.75—0.90%. Addition of 0.15% of citric acid is beneficial for aroma production. Cultures can be held for several months if frozen and stored at low temp. W. L. D.

Results of treating cheese milk or fresh curd with cured cheese. J. C. MARQUARDT (Nat. Butter and Cheese J., 1937, 28, No. 11, 20—22).—Addition of small quantities (0.25—5.0%) of ripe mould-ripened cheese to milk for cheese-making did not improve flavour; with hard cheese (Sap Sago) a slight improvement was observed. Adding ripe cheese to the curd did not improve flavour. W. L. D.

Manufacture of smoked-type cheese. J. C. MARQUARDT (Nat. Butter and Cheese J., 1937, 28, No. 9, 10).—Addition of 0.02—0.10% of pyroligneous acid to milk and making Cheddar and Provolone cheese by ordinary methods gave a successful simulation of the smoky flavour obtained by natural smoke. Addition of this acid to the rennet curd produced unsuccessful results. W. L. D.

Effect of freezing and thawing beef muscle on press fluid, losses, and tenderness. P. PAUL and A. M. CHILD (Food Res., 1937, 2, 339—347).—Total H₂O, drip, and tenderness of cooked beef are unaffected by freezing or by different thawing temp. E. C. S.

Influence of cold-storage temperature on the viability and infectibility of ox tapeworm in beef.

H. KELLER (Z. Fleisch- Milchhyg., 1937, 47, 393—397).—Viability and infectibility are lost at the following time-temp. combinations: -1° to -1.5°, 25 and 14 days; -2°, 7 and 5 days; -3°, 24 days and 1 hour; -4°, infectibility lost in 1 hr. W. L. D.

Partial disappearance of sex odour in boar pork by pickling. K. FLEISCHMANN (Z. Fleisch- Milchhyg., 1937, 47, 360—365).—The meat of boars is rarely free from sex odour and taste. The taint can be removed partly by wet- or dry-pickling. The wet process is inferior and improved the quality only in 43% of the cases. W. L. D.

Histological determination of liver in sausages and mince. L. CLAUSSEN (Z. Fleisch- Milchhyg., 1937, 47, 397—399).—The areas of eosin-stained liver tissue from diluted mince are estimated by comparison with mince of known liver content at the same magnification under the microscope. W. L. D.

Evaluation of meat meals from their bone contents. E. VAHLKAMPF (Z. Fleisch- Milchhyg., 1937, 47, 378—379).—The bone content of samples separated by sedimentation from a liquid of high *d* varied from 11.0 to 19.9%. There was no direct correlation between bone and total PO₄''' contents, owing to the different PO₄''' content of the protein fraction. Total PO₄''' varied from 10.4 to 13.4%. W. L. D.

Chemical and biochemical studies of halibut. I. Iced and frozen muscle juice. W. A. RIDDELL, H. N. BROCKLESBY, and L. I. PUGSLEY. II. Iced fish. H. N. BROCKLESBY and W. A. RIDDELL (Biol. Bd. Canada, Progr. Repts., 1937, No. 33, 13—16, 17—19).—I. Halibut-muscle juice stored at 1.5° showed no change in *p*_H, conductivity, oxidation-reduction potential, or *n* until the sixth day, when bacterial decomp. set in. Denaturation of proteins was progressive from the outset, and changes occurred which rendered the proteins more susceptible to denaturation after freezing and thawing.

II. The NME₃ content of the muscle of halibut kept on ice remained const. for approx. 12 days, and then rose rapidly as bacterial decomp. set in. Within this time only a very slight increase in NH₂-acids occurred, so that little autolysis could have taken place. E. C. S.

Free aqueous liquor in canned salmon. R. S. BOLTON and F. CHARNLEY (Biol. Bd. Canada, Progr. Repts., 1937, No. 33, 20—22).—The free aq. liquor varies inversely as the free oil content of the canned fish, and can therefore act as an index of its quality. E. C. S.

Preservation of [wet] fish by Dryice. O. NOTEVARP (Tids. Kjemi, 1937, 17, 125—126).—Fresh fish preserved with solid CO₂ during rail transport is of better quality and has a lower bacteria count than when H₂O-ice is used. M. H. M. A.

Potato mealiness and changes in softness on cooking. M. A. BARMORE (Food Res., 1937, 2, 377—383).—In addition to starch, protein has some influence on the texture of cooked potatoes. A high correlation is established between starch content and softening as measured by the penetrometer.

The softening process is interrupted at a certain stage during cooking, and hardening may actually occur. E. C. S.

Factors affecting the carotene content of certain vegetable foodstuffs. N. K. DE (Indian J. Med. Res., 1936, 24, 201—212).—Parboiling causes a slight loss of carotene (I) in rice, but the (I) content after "home-pounding" is > in raw rice owing to easier removal of the husk. Vac.-drying of leaves at 100° does not affect (I), but exposure of fresh leaves to diffuse sunlight causes a slight loss, and preservation under H₂O in presence of CH₂O or PhMe causes variable losses; an atm. of CO₂ prevents much loss from coriander in H₂O with PhMe. Storage of coriander and spinach leaves at various temp. causes loss of (I), the rate of destruction increasing with temp., but decreasing as the leaves become dry. Boiling does not affect (I) in leafy vegetables or potatoes, but removes it from legumes. Sprouting of pulses causes gradual loss of (I) until leaves form, when it rises suddenly and rapidly. R. N. C.

Apples. I. Physical and chemical properties of different varieties. M. FURUICHI (J. Agric. Chem. Soc. Japan, 1937, 13, 779—786).—Physical properties, total and reducing sugars, and titratable acidity have been determined for 130 varieties of apples. J. N. A.

Effect of ethylene and certain metabolic gases on respiration and ripening of pears before and after cold storage. E. HANSEN and H. HARTMAN (Plant Physiol., 1937, 12, 441—454).—Emanations from ripe pears increase the rates of respiration and of ripening of newly picked pears, the effect on fruit picked early being > on that picked in the post-mature stage. Production of C₂H₄ (as shown by leaf epinasty) increases with the intensity of respiration during the ripening of fruit. C₂H₄ produced no such effects in pears which had been kept in cold storage for a period. Diminished response to C₂H₄ is associated with increased respiration of fruit after picking. A. G. P.

Vitamin studies in bananas. I. Vitamin-A, -B₁, and -C contents of ripe bananas. P. L. HARRIS and G. L. POLAND (Food Res., 1937, 2, 311—319).—Ripe bananas contained 71—95 international units of -A, 4—5 of -B₁, and approx. 57 of -C per oz. The titration method does not determine the whole of the physiologically active -C in bananas. E. C. S.

"Squinter disease" in bananas, with special reference to its control. J. H. SIMMONDS and R. S. MITCHELL (Queensland Agric. J., 1937, 47, 542—548).—*Nigrospora* and *Gleosporium musarum* are controlled by dipping the fruit (preferably as single fruit) in 1% Shirlan A.G. (salicylanilide) until thoroughly wetted, draining, and packing. A. G. P.

Gas content of cranberries and possible relation of respiratory activity to keeping quality. W. B. ESSELEN, jun., and C. R. FELLERS (Plant Physiol., 1937, 12, 527—536).—Submergence increases the respiration of stored cranberries and the CO₂ content of the internal atm. In fruit remaining on trees respiration increases after maturity. Storage

temp. markedly affects keeping quality, which is paralleled by the CO₂ content and CO₂/O₂ ratio of the fruit. This ratio is a reliable basis for assessing the cold-storage quality of the fruit several months in advance. The N₂ content of the internal atm. of the fruit remains substantially const. and approximates to that of the air. Cranberries contain a definite amount of respirable material which must be used up before the initiation of physical breakdown in storage. High respiratory rates lead to increased susceptibility to disease. Catalase (I) and respiratory activity in stored cranberries are unrelated. The KMnO₄ titration method for determining (I) is inapplicable to cranberries owing to the presence of interfering substances. A. G. P.

Composition of summer squash and its relationship to variety, stage of maturity, and use as a food product. C. W. CULPEPPER (Food Res., 1937, 2, 289—303).—The % of EtOH-sol. and total solids, reducing and total sugars, acid-hydrolysable polysaccharides, acidity as citric acid, astringency, and NO₃' and total N of two varieties of summer squash at ages between 0 and 40 days are tabulated. The results of cooking and canning tests are discussed in relation to the optimum palatability of the vegetable. E. C. S.

Vitamin-C in citrus-juice beverages and canned grapefruit juice. J. A. ROBERTS (Food Res., 1937, 2, 331—337).—Samples of dairy-type citrus beverages contained 8—227 units of -C per oz., one sample of orangeade nil, and carbonated citrus beverages 0—5. Loss of -C is rapid in the first-named even at cold-storage temp. Canned grapefruit juice lost on an average 25% of its -C in 9—15 months. E. C. S.

Toxicity of fruit sprays. Lead-spray residue in apples and effects on consumers. R. H. HEEREN and H. B. FUNK (U.S. Publ. Health Rep., 1937, 52, 8—16).—The Pb content of Iowa apples (1935) varied from 0 to 4 p.p.m. (Federal standard = 2.6 p.p.m.), most samples showing figures <2.6 p.p.m. Imported apples also showed Pb contents < the standard. Apples from orchards receiving light sprays contained less Pb than those from orchards receiving heavy sprays. Consumers of these apples showed that the Pb ingested was not sufficient to produce toxicity. One case of As-dermatitis is reported. W. L. D.

Scenting of green tea with *Jasminum sambac*. T. H. WANG, S. M. NI, and N. H. CHEN (J. Chem. Eng. China, 1937, 4, 218—226).—The indole content of jasmine-scented tea is α the degree of scenting and is an index of the quality and condition. The constituents of the jasmine oil are adsorbed on the tea. Many determinations on teas which have been subjected to repeated scenting and "refining" are given. E. H. S.

Determination of flavin in foodstuffs. G. N. MURTHY (Indian J. Med. Res., 1937, 24, 1083—1092).—Flavin (I) is extracted from foodstuffs with 20% MeOH acidified to p_H 1.0, and after evaporation of the MeOH it is adsorbed on fuller's earth and eluted with a mixture of MeOH, C₅H₅N, and H₂O. The eluate is distilled in vac. to small bulk, treated with

COMe₂, centrifuged, and neutralised to p_H 7.0. (I) is then determined colorimetrically by comparison of its fluorescence in ultra-violet light against that of a standard. Light is excluded as far as possible and the solution is kept acid to avoid destruction of (I). Analytical results are given for 40 foodstuffs; they agree fairly closely with results from biological assay.

R. N. C.

Laboratory reports [of examination of food-stuffs] from the Food Inspection Department, Amsterdam. J. STRAUB, G. A. VAN STIJGEREN, and W. J. KABOS (Chem. Weekblad, 1937, 34, 730—733).—Reducing sugars can be removed quantitatively from starch syrups by dialysis (>3000 c.c. of H₂O for 4 g.) in a Schleicher-Schüll parchment thimble. Neither the colour of the fluorescence of the egg shell nor the P₂O₅ content of the white is an indication of the freshness or otherwise of individual eggs, although they may be of some significance if a sufficiently large no. of eggs are examined from a large consignment.

S. C.

Nutritive value for dairy cows of lucerne hay injured by sulphur dioxide. O. C. CUNNINGHAM, L. H. ADDINGTON, and L. T. ELLIOT (J. Agric. Res., 1937, 55, 381—391).—The feeding val. of lucerne hay was not significantly affected by fumigation with SO₂ sufficient to cause acute injury to 25% of the leaflets.

A. G. P.

Effect of protein deficiency in the ration on amount of feed consumed by lambs. J. I. MILLER (J. Agric. Res., 1937, 55, 467—474).—Low-protein rations caused digestive disorders and diminished the amount of food which lambs would consume.

A. G. P.

Biological value of casein as a supplement to the proteins of barley in rations for pigs. E. H. HUGHES (J. Agric. Res., 1937, 55, 461—465).—With barley as the sole source of protein the growth of pigs was slow and food consumption per unit increase of wt. was high. Supplementary feeding of casein accelerated growth and diminished the food required per unit increase. A similar though smaller effect was produced by increasing the proportion of barley protein by means of brewers' grains. The beneficial effect of unwashed casein may be due to its lactoflavin content.

A. G. P.

Digestibility and biological value of potato protein. E. MANGOLD (Z. Spiritusind., 1937, 60, 303).—Potato protein, obtained, *e.g.*, as a by-product in starch manufacture and dried alone or on pulp, is a suitable source of protein for pigs. For poultry it is less suitable and needs supplementing with, *e.g.*, skim milk.

I. A. P.

Composition of the residual peel and of the "bran" in [potato] meal manufacture. B. LAMPE and R. DEPLANQUE (Z. Spiritusind., 1937, 60, 295—296).—The compositions of several samples of peel obtained in the milling of potatoes for flake and meal manufacture, and of the "bran" (Flockenkleie), are quoted. Removal of the peel, which is essential in preparing meal for baking purposes, is undesirable when preparing fodder material, as it results in protein impoverishment. Further, for baking meal, coarse milling is necessary since a high degree of dis-

integration increases the discoloration tendency, due to passage to the product of materials arising from the layers immediately beneath the peel.

I. A. P.

Dry spent wash and "wash flakes." VON BLANCKENBURG (Z. Spiritusind., 1937, 60, 335—336).—The val. of spent wash from potato distilleries as fodder material is discussed, and a process is described whereby a semi-solid paste is removed from the wash by a sieving process and mixed with fresh potato material for flaking, thus augmenting the protein content of the resultant flakes, the paste protein being converted into a durable form. The separated thin wash, remaining hot, is still suitable for preparing cattle wash.

I. A. P.

Digestion of cell-wall constituents of fodders (lignin, pentosans, cellulose, and crude fibre) by chickens. A. TSCHERNIAK (Bied. Zentr. [Tierernähr.], 1936, A, 8, 408—462).—The cellulose (I), lignin (II), and pentosans (III) of lucerne were practically undigested by hens. In grain and soya-bean feeds (I) is undigested, but $\frac{1}{3}$ — $\frac{2}{3}$ of the (II) and (III) were utilised.

A. G. P.

Determining ice-H₂O relation [of peas etc.].—See XI. **Storing olive oil. Deodorising edible oil. Lecithin.**—See XII. **Treating honey combs.**—See XVI. **Storage of potatoes.**—See XVIII. **Flavourings and essences.**—See XX. **Food poisoning.**—See XXIII.

See also A., III, 457, **Constituents of cow's milk. 466, Feeding of sheep. Nutrient val. of maize sugar. 490, Skim-milk agar for routine milk counts. 493—8, Vitamins. 500, Ripening fruits in presence of C₂H₄. 503, Odorous substances of green tea.**

PATENTS.

Preparation of emulsions [margarine]. H. SCHOU (B.P. 472,086, 18.8.36).—Emulsions of H₂O or aq. liquids in org. substances insol. in H₂O, particularly oils and fats, are prepared by using as emulsifying and stabilising agents condensation products of higher fatty acids and polysaccharides dispersed or dissolved in the oil phase. The condensation products may contain free polysaccharide OH groups and preferably >60% of the fatty component, and may be used in conjunction with other emulsifying and stabilising agents. *E.g.*, 5—15 pts. of a condensation product of dextrin and C₁₇H₃₅CO₂H, containing about 60% of the latter, are dissolved in 1000 pts. of a mixture of cottonseed oil, coconut oil, etc., and 200 pts. of skim milk acidified by bacterial aid are dispersed in the melted fat mixture. NaCl, colouring and other substances may be added and the finished emulsion cooled and kneaded. The margarine so obtained does not lose H₂O during manufacture, transport, or storage.

R. G.

Instantaneous preparation of ice creams, or freezing of other comestibles or potable liquids. A. F. GENOVA (B.P. 473,291, 8.4.36).—The feed material is thrown by centrifugally rotating jets against a chilled (convergent-conical) surface and the frozen material is worked along by a helical rake.

B. M. V.

Meat-treating method. H. H. MCKEE and G. R. HENNEY, Assrs. to SWIFT & Co. (U.S.P. 2,060,422, 10.11.36. Appl., 14.11.30).—The meat is frozen at between -3 and 0° and subjected to mechanical pressure to impart a brighter colour. B. M. V.

Treatment of meat waste and butchers' offal and generally meat of low value, for recovery of fat therefrom. J. C. KERNOT (B.P. 468,061, 27.9.35).—Meat waste (containing approx. 75% of fat) is packed into bags which are placed between two perforated plates in a steam-jacketed tank, together with four times the wt. of a dil. Na_2CO_3 (or naphthalenesulphonate) solution. The material is heated at approx. 100° and the liquid, together with separated fat, is then drawn off, while the residues are submitted to mechanical pressure; this operation is repeated. The fat is then separated from the aq. phase and the residues are dried and ground to meal. E. B. H.

Removal of insecticidal residues from [deciduous] fruits and vegetables. R. H. CARTER, Ded. to U.S.A. (U.S.P. 2,046,547, 7.7.36. Appl., 23.5.34).—Insecticidal residues containing F (fluoaluminates, -silicates, -ferrates, etc.) are removed by washing in cold or hot aq. solutions of 0.1–2.5% HCl or H_2SO_4 and 1–5% $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ or $\text{Fe}_2(\text{SO}_4)_3$. E. B. H.

Treatment of chocolate and materials for addition thereto. CROSSE & BLACKWELL, LTD., W. CLAYTON, S. BACK, J. F. MORSE, and R. I. JOHNSON (B.P. 469,112, 18.1.36).—The fluidity and/or resistance to bloom of chocolate are improved by addition of small amounts (<1%) of a polymerised oxidised fat of the oleodistearin type, such as, particularly, the product obtained by blowing heated cacao butter. (Cf. B., 1937, 975.) E. L.

Receptacle [for cooking]. M. H. SOMMER (U.S.P. 2,057,254, 13.10.36. Appl., 18.8.34).—Cooking vessels are constructed of three-ply sheet, the middle layer being Cu or other good heat conductor, the inner stainless steel, and the outer vitreous enamel. B. M. V.

Apparatus for treating and dispensing beverages. A. R. SPEER (U.S.P. 2,057,068, 13.10.36. Appl., 6.9.33).—Beer or other beverage is discharged from a cask by the pressure of ozonised air. B. M. V.

Centrifugal dryer. Drying org. substances. Hammer mill. Grinding mill. Grinding machine [for coffee etc.]. Centrifugal separator. Compressing gas [for aerated waters].—See I. Enamel slips.—See VIII. Irradiating apparatus [for milk etc.].—See XI. Treating fatty oils. Salad oil.—See XII. Moulding plastic substances.—See XIII. Vitamins.—See XX.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Determination of moisture [in drugs] by means of toluene. H. G. DEKAY (J. Amer. Pharm. Assoc., 1937, 26, 708–711).—Data for the H_2O content of various drugs determined by the PhMe method are tabulated. The method, which gives results consistently < those by the oven-drying

method, includes distillation for 3 hr. and can be applied to some drugs containing a volatile constituent. F. O. H.

Detection of methyl alcohol and/or isopropyl alcohol in alcoholic [pharmaceutical] preparations. W. MEYER (Pharm. Zentr., 1937, 78, 669–676).—The K xanthates are isolated and titrated with I, and from the I val. and the m.p. the composition is judged. E. H. S.

Decomposition of paraldehyde B.P. on storage. J. S. TOAL (Quart. J. Pharm., 1937, 10, 439–444).—Samples of paraldehyde (I) stored in the dark for 2 months deteriorated to varying extents, the change being accompanied by an increase in d and peroxide content. Deterioration of freshly distilled (I) occurs under ordinary conditions, and addition of a suitable preservative is recommended. F. O. H.

Determination of acriflavine and related compounds in pharmaceutical preparations and surgical dressings. G. F. HALL and A. D. POWELL (Quart. J. Pharm., 1937, 10, 486–497).—Modifications of the authors' method (B., 1937, 87) so that it is applicable to the determination of diaminoacridine derivatives in surgical dressings, emulsions, etc. are described. Reducing substances in the fabric or basis of the prep. are liable to cause errors of, e.g., 5–13% with glycogelatin base and dressings; the possibility of obviating them is discussed. The euflavine content of dressings varies considerably and decreases on exposure to light. F. O. H.

Assay of spirit of camphor. S. W. GOLDSTEIN and W. F. REINDOLLAR (J. Amer. Pharm. Assoc., 1937, 26, 887–889).—The U.S.P. XI method is criticised and a modification of Randall's method (B., 1924, 653) suggested. F. O. H.

(A) **Eusol.** (B) **Camphorated chalk.** C. L. M. BROWN (Quart. J. Pharm., 1937, 10, 396–401).—(A) The available Cl content of eusol preps. (recommended composition is chlorinated CaO 1.25, H_3BO_3 1.25% in H_2O) shows a seasonal variation, being high in February and March and low in September. Storage at $<9^{\circ}$ is recommended.

(B) Camphor pptd. from EtOH by H_2O contains approx. its own wt. of H_2O . Freshly prepared camphorated chalk (B.P. Codex, 1934) may contain as low as 9 wt.-% of camphor. F. O. H.

Assay of calcium sodium lactate. S. G. LIVEREDGE (Quart. J. Pharm., 1937, 10, 364–368).—Modifications in the method of the B.P. Codex, 1934, are recommended. Na is determined by Kahane's method (A., 1930, 880) and lactic acid by that of Friedemann *et al.* (A., 1927, 800). F. O. H.

p_{H} studies of milk-of-magnesia with the glass electrode. J. A. C. BOWLES and E. C. MERRILL (J. Amer. Pharm. Assoc., 1937, 26, 717–721).—Milk-of-MgO made by direct hydration or double-decomp. methods increases in p_{H} (by 0.07 and 0.6, respectively) on storage for 9 months in ordinary glass bottles. The change is inhibited by 0.1% of citric acid (I), addition of which lowers the η of the prep. The η of direct-hydration preps. tends to increase on keeping, but not in presence of (I). F. O. H.

[Medicinal] magnesium trisilicate. N. MUTC (Brit. Med. J., 1937, II, 735—739).—Medicinal Mg trisilicate should have the composition $Mg_2H_4Si_3O_{10}$, and should give the diffraction radiograph of natural "sepolite No. 1." Marketed brands often fail to conform to that specification. Artificial sepolite No. 1 does not cause alkalosis; it reacts with HCl at a rate and to an extent which diminishes with the [HCl]. Within limits it can be administered without decreasing gastric acidity sufficiently to destroy peptic activity. A. G. P.

Determination of official preparations of iron by means of ceric sulphate. II. Assay of pill of iron carbonate. III. Assay of citrated ferrous chloride. G. C. LYONS and F. N. APPELYARD (Quart. J. Pharm., 1937, 10, 343—347, 348—350; cf. B., 1937, 85).—II. The prep. (2 g.) is treated with 8 ml. of 25% H_2SO_4 , diluted with 20 ml. of H_2O , and titrated with 0.1N- $Ce(SO_4)_2$, using phenylanthranilic acid as internal indicator.

III. The prep. (0.5 g.) is dissolved in 20 ml. of dil. H_2SO_4 and titrated as above. F. O. H.

Determination of ferrous iron in pharmaceutical preparations. Choice of indicators in the titration of ferrous iron by ceric sulphate. G. J. W. FERREY (Quart. J. Pharm., 1937, 10, 351—356).—The use of xylene-cyanole FF or $NHPh_2$ as internal, and of $K_3Fe(CN)_6$ as external, indicator in the titration of Fe^{2+} is discussed. With citrated $FeCl_2$ preps., titration by Heisig's iodate method (A., 1928, 861) or $Ce(SO_4)_2$ is satisfactory. With $FeCl_2$ in glyco-gelatin capsules, titration with $Ce(SO_4)_2$ gives accurate results, any error due to PhOH added as preservative being small. F. O. H.

Preparation and properties of bismuth subiodides. N. GLASS (Quart. J. Pharm., 1937, 10, 357—363).—Commercial preps. of BiOI vary considerably in their composition and physical character. Digestion of Bi subnitrate with aq. KI gives preps. containing the equiv. of 66.2—71.4% of Bi_2O_3 and of normal powder character. Addition of a Bi solution containing min. free acid to cold aq. KI, however, gives ppts. conforming in composition with BiOI and of an oily nature with great covering power. F. O. H.

Inorganic preparations of the Indian indigenous medicine. II. *Banga Bhasma* (calcined tin). III. *Lauha Bhasma* (calcined iron). IV. *Raupya Bhasma* (reduced silver). V. *Svarna Bhasma* (reduced gold) and *Gold Kusth*. R. N. CHOPRA, S. GHOSH, and A. DUTT (Indian J. Med. Res., 1936—37, 24, 257—259, 517—520, 1137—1139, 1141—1144).—The chemical compositions of the preps. and their sol. portions are given. R. N. C.

Assay of [pharmacopœial] solution of iodine. C. MORTON and F. R. C. BATESON (Quart. J. Pharm., 1937, 10, 498—502).—Application of the method of titrating KI in presence of KCN (cf. Berg, A., 1926, 1017) to the determination of free, combined, and total I in B.P. preps. of I is described. Examination of decolorised solution of I (B.P. Codex) failed to reveal the presence of IO_3^- ; CHI_3 occurs in fresh, but not in old, preps., whilst formate is absent. F. O. H.

Significance and determination of sulphur in different forms of combination in medicinal preparations. E. SCHULEK and O. CLAUDER (Pharm. Zentr., 1937, 78, 625—630, 653—660).—Free S is determined by conversion into KCNS after heating with KCN, methane-sulphonic and -sulphoxylic radicals are decomposed by distillation with H_2PO_4 , and arylsulphonic acids are decomposed in the calorimetric bomb. Many examples are given. E. H. S.

Sterilising substances used in pharmacy. G. LUSIGNANI (Boll. Chim. farm., 1937, 76, 504—505).—Two commercial preps. are shown to consist of $KClO_2$ and $p-C_6H_4Me \cdot SO_2 \cdot NClNa$, respectively. F. O. H.

Sterilising effects of mixtures of air and steam, and of superheated steam. R. M. SAVAGE (Quart. J. Pharm., 1937, 10, 451—462).—When the air is removed by means that do not of themselves effect any sterilisation, no evidence is obtained that mixtures of air and steam are less effective than is steam alone. Steam does not lose its sterilising action when superheated. Sterilisation by steam under varying conditions is discussed. F. O. H.

Penetration of heat into surgical dressings enclosed in drums. R. M. SAVAGE (Quart. J. Pharm., 1937, 10, 445—450).—Sterilisation of dressings in the hospital type of perforated drum is vitiated by the effect of the drum in converting the separate dressings into one large package. The heat exchange during vac. and pressure steam treatment and the possibility of improving the degree of sterilisation (e.g. by the use of crates or bags) are discussed. F. O. H.

Evaluation of tragacanth and its mucilages. A. B. NICHOLS (J. Amer. Pharm. Assoc., 1937, 26, 823—830).—The origin of variations in η of tragacanth (I) mucilages is discussed and a suitable falling-sphere method of determination is proposed, (I)-containing preps. of ephedrine sulphate being exemplified. F. O. H.

Relationship between constitution of tragacanth gum and viscosity of its mucilage. J. M. ROWSON (Quart. J. Pharm., 1937, 10, 161—176).—A method for determination of sol. and insol. constituents of the gum is described. The OMe content is a measure of the amount of bassorin (I), and, in general, a gum with high OMe yields a mucilage of high η . Dry heating of the gum decreases both the (I) content and η . The sap. vals. are not related to other physical and chemical const. of the gum. Alterations in the B.P. monograph on tragacanth are suggested. J. N. A.

Value of compound tragacanth powder as a suspending agent. J. M. ROWSON (Quart. J. Pharm., 1937, 10, 404—412).—Addition of mucilage of acacia to that of tragacanth gives a mixture having $\eta <$ that of either constituent mucilage, the gel masses of the latter being dehydrated and flocculated. Min. η occurs with 20% of acacia mucilage in the mixture. The η and suspending powers of tragacanth mucilage in compound tragacanth powder are reduced by acacia mucilage (but not by the sucrose or starch) present, electrolytes having no effect on the action.

The omission of acacia mucilage from the powder is therefore recommended. F. O. H.

Podophyllum resin. Test for insoluble matter. D. B. DOTT (Pharm. J., 1937, 139, 469).—The B.P. test is not satisfactory. The so-called insol. matter becomes more sol. the longer the aq. NH_3 mixture is kept. The following modified test is suggested: 0.5 g. of the powdered resin is shaken for 20 min. with 20 ml. of dil. aq. NH_3 and 15 ml. of H_2O and then set aside for 15 min. before filtering. E. H. S.

Comparative antiseptic properties of certain ointments employing various bases. W. A. PROUT and M. STRICKLAND (J. Amer. Pharm. Assoc., 1937, 26, 730—734).—The bacteriostatic properties of H_3BO_3 , Hg_2Cl_2 , chrysarobin, PhOH , S, and ZnO in fatty bases (wool fat or hydrogenated fats) are $>$ those in non-fatty bases. Comparative data by the agar cup-plate and agar-plate methods are given. F. O. H.

Detection of preparations of senega in mixtures. J. RAE (Pharm. J., 1937, 139, 466; cf. B., 1935, 253).—To 2 ml. of the mixture are added 2 ml. of 10% NaNO_2 solution and 3 drops of conc. H_2SO_4 . After 30 sec. 20 ml. of $\text{N-Na}_2\text{CO}_3$ are added. If senega preps. are present a claret to red colour will be produced. E. H. S.

Adsorption fluorescence reaction of various species of rhubarb. S. K. CREWS (Quart. J. Pharm., 1937, 10, 369—370).—The fluorescence reactions for various species are tabulated (cf. B., 1937, 87). F. O. H.

Pungency values of capsicum and its tincture. H. BERRY and E. K. SAMWAYS (Quart. J. Pharm., 1937, 10, 387—395).—Comparative data are given for the pungency val., fraction sol. in light petroleum (b.p. 40—50°), and yield of B.P. Codex oleo-resin of various commercial preps. of capsicum (*C. annuum* and *C. minimum*) and for the pungency val. of preps. of tincture of capsicum. Standard min. limit tests for the pungency val. are suggested. F. O. H.

Precipitation in fluid extract of Uva ursi. II. Effect of heat and selective solvents. J. E. BALL and C. O. LEE. III. Identification of the crystalline precipitate. IV. Cause and prevention of precipitation. L. M. PARKS and C. O. LEE (J. Amer. Pharm. Assoc., 1937, 26, 698—702, 702—705, 706—708).—II. Arbutin (I) is not extracted from the drug by EtOAc , xylol, Bu°OH , or C_6H_{14} . Fluid extracts of the autoclaved drug deposit an amorphous rather than a cryst. ppt. Filtration of crude extracts vitiates accurate determination of the tannin content. A colorimetric assay of (I) is described.

III. The cryst. ppt. consists of ellagic acid, which is not preformed in the drug but forms in the fluid extract on keeping.

IV. The ppt. is due to enzymic action and is prevented by autoclaving the extract at 110° for 30 min. on 3 successive days. F. O. H.

Constituents of pyrethrum flowers. III. Pyrethrin content of fresh flowers. F. ACREE, jun., P. S. SCHAFFER, and H. L. HALLER (J. Econ. Entom., 1936, 29, 601—605).—Pyrethrins I and II

exist, as such, in flowers. Enzymes and H_2O have no significant influence on the synthesis or decomp. of pyrethrins during the drying of flowers. A. G. P.

Pyrethrin content of pyrethrum flowers from various sources. D. G. HOYER and M. D. LEONARD (J. Econ. Entom., 1936, 29, 605—606).—Analyses are recorded. A. G. P.

Occurrence of rotenone in Millettia pachycarpa. T. P. GHOSE and S. KRISHNA (Current Sci., 1937, 6, 57).—From samples of roots of *M. pachycarpa* 4% of total resins and 1.2% of rotenone have been isolated. F. R. S.

Chemical differences in the constituents of fresh and stored medicinal plants. W. POETHKE (Chem.-Ztg., 1937, 61, 949—951).—A review.

Appearance of National Formulary VI crude vegetable drugs under ultra-violet light. M. S. DUNN and W. H. KIMMER (Amer. J. Pharm., 1937, 109, 498—511).—The visible effects produced by exposure of the whole drug and fresh surfaces of 109 drugs are tabulated. E. H. S.

Preservation of concentrated and fresh infusions. I. Application of heat and alcohol. K. BULLOCK and C. J. L. ELSDON (Quart. J. Pharm., 1937, 10, 413—438).—Preserved or conc. infusions of various drugs are inferior to freshly prepared infusions. The effect of storage on the growth of micro-organisms indicates that conditions recommended for storage, in descending order of preference, are: (a) fresh infusions sterilised by heat-treatment, (b) conc. infusions sterilised by heat-treatment, and (c) conc. infusions preserved with min. amounts of EtOH (10% for clove and senna, 15% for other official conc. infusions). Fresh infusions of quassia, senna, and, more especially, calumba (which contains resistant organisms) are advantageously boiled after prep. F. O. H.

Common and oriental cardamoms. A. VIEHOEVER and L. K. SUNG (J. Amer. Pharm. Assoc., 1937, 26, 872—887).—Histological characteristics and analytical data of the volatile oil of fruits from *Elettaria* and *Amomum* spp. are given. Bitter Chinese cardamom yields a bitter, cryst. camphor, m.p. 110—112°. The pharmaceutical application of the various species is discussed. F. S. H.

Quinine content of Cinchona Ledgeriana bark from Cameron Highlands. C. D. V. GEORGI and G. L. TEIK (Malay. Agric. J., 1937, 25, 421—424).—The bark of sixty trees contained 8—14% of total alkaloids, including 5—10% of quinine. There was no difference between the bark of trees grown with and without shade. R. S. C.

Cinchona extract with senega. C. J. T. MADSEN (Dansk Tidsskr. Farm., 1937, 11, 221—240).—Extraction of the powdered bark with boiling H_2O for 30 min. dissolves out 55—65% of the alkaloids, but on repeating this four times only 60—70% is dissolved. The amount of solvent used has very little effect on the process. Extraction is, however, improved by addition of org. acids, and is almost complete with dil. HCl of p_H 2.4—2.6. Extraction of senega root by cinchona extract is poor, as the tannic acid in the

liquid forms an insol. compound with senega saponin. It is recommended that the extracts be made separately and mixed in the cold. Pptn. of the saponin-tannic acid complex is thus avoided, but occurs if the temp. is raised. M. H. M. A.

Determination of the alkaloids of ephedra. F. E. RYMILL and C. A. MACDONALD (Quart. J. Pharm., 1937, 10, 463—465).—When the final extraction of the alkaloids in the B.P. Codex, 1934, method is with CHCl_3 and not Et_2O , the final titration with 0.1N-NaOH has a sharper end-point, thus affording somewhat higher and more consistent results. F. O. H.

Colorimetric determination of morphine. D. C. GARRATT (Quart. J. Pharm., 1937, 10, 466—470).—The B.P. method is improved in accuracy and ease of performance by making the blank ammoniacal and adding to it a vol. of test solution equal to that used in the test. A further modification is necessary with aromatic powder of chalk with opium but not with powder of ipecacuanha and opium. The method is applicable to gall and opium ointment and tincture of CHCl_3 and morphine. F. O. H.

Alkaloid determination in *Chelidonium* ϕ . H. NEUGEBAUER and K. BRUNNER (Apoth.-Ztg., 1937, 52, 1038—1039; cf. B., 1937, 286).—Total alkaloids less berberine (I) are determined by a modification of the method described previously (*loc. cit.*) and in the titrated solution chelidonine and protopine are isolated by pptn. with HCl. (I) is determined in the first aq. residue as the picrolonate. The proportionate amounts of these alkaloids present in different tinctures are not const. E. H. S.

Isolation of nicotine from Kwangsi tobacco leaves. Y. F. CHI and I. CHANG (J. Chem. Eng. China, 1937, 4, 255—256).—The powdered leaves contained 2.4% of crude nicotine. E. H. S.

[Pharmacognosy of] *Rigelia ethiopica*, Decne. C. MASINO (Boll. Chim.-farm., 1937, 76, 525—528).—The seeds (120 g.) yield an oil (10 g.), d^{15} 0.964, acid val. 1.23, sap. val. 192, I val. 154.6, and contain arabinose. The fruit does not contain tannin. F. O. H.

Vitamin content and therapeutic value of tunny oil. G. SANNA (Boll. Chim.-farm., 1937, 76, 497—500).—Clinical and biological tests indicate the relatively high therapeutic efficacy and vitamin-D content of the oil. F. O. H.

Extraction of citrus oils. Modern mechanical methods. F. K. DONOVAN (Perf. Essent. Oil Rec., Spec. No., 1937, 3—34).—Hand processes, machines for treating separated peels and crushed fruits, and the effect of the process used on the oil produced are described; notes on the deterioration and keeping qualities of the oil and citric acid recovery are also given. E. H. S.

New sources of Italian lavender oil. V. MASSERA (Boll. Chim.-farm., 1937, 76, 531—532).—Analytical data are given for oils from *Lavandula officinalis* grown in Salerno and Perugia. F. O. H.

Determination of volatile oil in drugs. H. O. MEEK and F. G. SALVIN (Quart. J. Pharm., 1937, 10, 471—485).—Of the methods generally used, distillation

from H_2O into a graduated receiver, using cohobation, is the most common. A new modification of this type of apparatus, using aq. glycerol in place of H_2O , is described and results from various powders and drugs are tabulated. F. O. H.

Natural flavouring materials and essences. S. W. BRADLEY and G. R. A. SHORT (Chem. and Ind., 1937, 1018—1021).—A review of the fruit-juice concentrates and extracts of other naturally occurring products (herbs, roots, barks, etc.), essential oils, and synthetics used as flavouring materials in confectionery, beverages, and tobacco. T. F. W.

Mol. distillation [of cod-liver oil].—See I. Vitamin-A and -D in herring etc. Lecithin.—See XII. Majdi incense.—See XIII. Derris root. Blue mould of tobacco.—See XVI. Scenting of green tea.—See XIX.

See also A., II, 491, As compounds. Carbamides as hypnotics. 505—6, Hormones. 511, Constituents of pyrethrum flowers. Plants used against snake venom and malaria. 512, Chasmanthin from calombo root. 518, Antimalarials. 524, Applications of furfuraldehyde. 525, Synthesis of antineuritic vitamin. 526—8, Alkaloids. 528, Organo-As compounds. III, 454, Purified diphtheria antigen. Prep. of Krueger undenatured bacterial antigens. 455, Determining I in thyroid gland. 487, Isolation of sp. antigen from *B. dysenteriae*, Shiga. 489, Tobacco-mosaic virus. 493—8, Vitamins. 496, Prep. of ascorbic acid. 503, Determination of coumarin in sweet clover. [Oil from] green tea. 504, Vitamin-C and derivatives in *Chuchuhuasha* bark.

PATENTS.

Manufacture of sulphonic acid amide compounds. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 474,423, 28.4.36).—Acyl derivatives of *p*-aminobenzenesulphonamides or aminobenzenedisulphonamides in which the acyl group is the residue of an aliphatic or araliphatic monocarboxylic acid of $< \text{C}_5$ are said (unlike the lower acyl derivatives) to have activity against streptococci, resembling that of $p\text{-NH}_2\cdot\text{C}_6\text{H}_4\cdot\text{CO}\cdot\text{NH}_2$; their manufacture by standard methods is claimed. *p*-Ole-, m.p. 197°, *p*-hex-, m.p. 201°, *p*-oct-, m.p. 198°, *p*-laur-, m.p. 198°, *p*-myrist-, m.p. 203°, *p*-palmit-, m.p. 202°, *p*-stear-, m.p. 201°, *p*-undecen-, m.p. 199°, *p*-eruc-, m.p. 177°, *p*-behen-, m.p. 171°, *p*-phenylacet-, m.p. 201°, *p*-valer-, m.p. 214°, and *p*-cinnam-amidobenzenesulphonamide, m.p. 265°, 1-lauramidobenzene-3:5-disulphonbismethylamide, m.p. 96°, *p*-lauramidobenzenesulpho-benzylamide, m.p. 134°, *n*-butylamide, m.p. 113°, and *p*-piperidide, m.p. 103°, 4-oleamido-3:6-dimethoxybenzene-, m.p. 145°, 2-oleamido-*p*-xylene-5-, m.p. 207°, 6-oleamido-*m*-toluene-, m.p. 138—140°, 5-oleamido-*o*-toluene-, m.p. 150°, 6-oleamido-, m.p. 148°, and 6-isovaleramido-4-methoxytoluene-, and 4-chloro-5-oleamido-*o*-toluenesulphonamide, and *p*-isovaleramidobenzenesulphocyclohexylamide, m.p. 197°; also 2-amino-*p*-xylene-5-, m.p. 191° (hydrolysis of its Ac derivative), 6-amino-*m*-toluene-, m.p. 160°, 5-amino-*o*-toluene-, m.p. 171°, 6-amino-4-methoxytoluene-, m.p. 183°, and 4-chloro-

5-amino-o-toluene-sulphonamide, m.p. $>300^\circ$, are described. H. A. P.

Preparation of sterol derivatives. PARKE, DAVIS & Co., Asses. of R. E. MARKER (B.P. 473,923, 18.8.36. U.S., 26.8.35).— β - and *epi*-Cholestanol are converted by SOCl_2 at 40° with Walden inversion into *epi*-, m.p. 110 – 111° , and β -chlorocholestanol, m.p. 100° , respectively. Prep. of similar Br-compounds is also claimed. R. S. C.

Manufacture of water-soluble derivatives of cyclopentanoperhydrophenanthrenes. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 473,629, 18.4.36 and 25.2.37).— H_2O -sol. derivatives are obtained by sulphonating (H_2SO_4 - Ac_2O) cyclopentanoperhydrophenanthrene derivatives which have 1 CO in ring A or B. Sulphonic acids are obtained from cholestanone, m.p. 193 – 195° , cholesten-7-one, m.p. 178 – 180° (decomp.), androstenedione, decomp. 196° (*Me* ester, m.p. 159 – 160°), progesterone, decomp. 190 – 192° , cholestanone, m.p. 146 – 148° , and coprostanone. R. S. C.

Purification of synthetic camphor. "MONTECATINI," SOC. GEN. PER L'INDUSTRIA MINERARIA ED AGRICOLA (B.P. 474,097, 15.7.36. It., 15.7.35).—Camphor is dissolved to saturation in glacial AcOH and the solution diluted with H_2O to 25% AcOH; the pptd. camphor is filtered off. The impurities (pinene, borneol) are esterified by, and remain dissolved in, the AcOH. H. A. P.

Preparation of N-substituted camphoric amides. G. B. ELLIS. From SOC. DES USINES CHIM. RHÔNE-POULENC (B.P. 473,995, 27.4.36).—Inter-*action* of the mixed chlorides from *d*-camphoric acid and PCl_5 with NHEt_2 in C_6H_6 gives *d*-, m.p. 130° , $[\alpha] +90^\circ$ in abs. EtOH, plus some 1-camphordicarboxybisdiethylamide (I); 1-isocamphordicarboxybisdiethylamide, m.p. 80° , and *d*-camphordicarboxybisdimethyl-, m.p. 91° , b.p. $175/2$ mm., *dibutyl*-, b.p. 220 – $222^\circ/1$ mm., *diamyl*-, b.p. 230 – $232^\circ/1$ mm., and *methyl-ethyl-amide*, m.p. 61° , b.p. $180/2$ mm., are similarly prepared. (I) is also prepared from *d*-camphoric monodiethylamide through the acid chloride, as are also *d*-camphordicarboxy- α -diethylamide- β -methyl-ethylamide, m.p. 56° , b.p. $173/2$ mm., and α -dimethylamide- β -diethylamide, m.p. 41 – 42° , b.p. $187/3$ mm. The products are said to have therapeutic val. H. A. P.

Manufacture of readily soluble salts of 9-aminoacridine compounds. I. G. FARBENIND. A.-G. (B.P. 473,555, 14.4.36. Ger., 13.4.35).—Alkanesulphonates of 9-amino- and -alkylamino- (not -dialkylamino-)acridine or their derivatives are claimed as sol. salts suitable for injection. 6:9-Diamino-2-ethoxyacridine methanesulphonate has m.p. about 268° ; similar salts of 9-ethylamino-2-ethoxy- and 9-butylamino-acridine are also specified. R. S. C.

Preparation of neutral salts [gluconates] of medicinal alkaloids. T. HAEGLAND, Assr. to MERCK & Co., INC. (U.S.P. 2,049,442, 4.8.36. Appl., 12.7.32).—A boiling aq. solution of gluconic acid ($\approx 40\%$) is gradually neutralised with a hot, conc. solution of an alkaloid. The prep. of I (B.)

methoxycinchonidine gluconate (m.p. not given) is claimed. Other compounds mentioned are the gluconates of quinine, quinidine, cinchonine (and OMe homologue), cinchonidine, strychnine, brucine, and the alkaloids of nux vomica and opium. E. H. S.

Tobacco product and method of conditioning same. J. T. POWER and K. R. BROWN, Assrs. to ATLAS POWDER Co. (U.S.P. 2,067,338, 12.1.37. Appl., 5.9.34).—Tobacco is conditioned with regard to H_2O content by admixture with sorbitol, either in solution or dry, and with or without the addition of glycerol. D. M. M.

Production of antirachitically active preparations. N. V. PHILIPS' GLOEILAMPENFABR. (B.P. 471,994, 13.4.36. Ger., 19.6.35).—The fatty matter from numerous invertebrates (other than *Helicidae*) gives sterol fractions containing 0.25% of provitamin-D, which give very active products when irradiated. Examples describe the use of sea-mussel, periwinkle, meal-worms, earth-worms, leeches, sponges, and starfish. R. S. C.

Production of substances for promoting the growth of backward infants. G. GRÖH (B.P. 467,825, 23.12.35).—Whole colostrum (preferably from cows), or the proteins (casein, globulin, and albumin) separated therefrom by known methods, is/are dried and defatted. E. H. S.

Concentrating the vitamin content of milk and [milk] products. C. DICKENS (U.S.P. 2,052,218, 25.8.36. Appl., 19.10.32).—Milk, freed from fat and curd, is conc. by evaporation at $\approx 95^\circ$ and, after adjustment of the p_H to 6–7, is set aside and filtered. The filtrate is treated with EtOH, set aside, and filtered again, the EtOH distilled off at $\approx 95^\circ$, and the resulting clear liquor conc. and cooled. If necessary, a further filtration may be given. E. H. S.

Production of [water-soluble, antineuritic] vitamins. R. R. WILLIAMS and R. E. WATERMAN, Assrs. to RESEARCH CORP. (U.S.P. 2,049,988, 4.8.36. Appl., 27.9.32).—The vitamin, adsorbed on, *e.g.*, fuller's earth, is removed therefrom by extraction with an aq. acid solution of a polyacidic org. nitrogenous base, *e.g.*, an alkaloid, basic dye, or guanidine derivative. E. H. S.

Hair-treating medium. G. F. STROHER (B.P. 473,638, 29.5.36).—A prep. for nourishing hair consists of a clear aq. solution of lecithin, a sulphonated oil or fat, *e.g.*, highly sulphonated olive oil, and an additional dispersing agent, *e.g.*, sulphonated high-mol. alcohols or their esters, or acidyl derivatives of taurine, as alkali salts or albumin condensation products (prepared by interaction of albumin decomp. products with sebacyl chloride in alkaline solution). N. H. H.

Solutions for permanently waving hair. F. STROHER A.-G. (B.P. 473,641, 6.8.36. Ger., 7.4.36).—Aq. solutions of additive products of ketones or aldehydes with bisulphites or hydrosulphites, *e.g.*, $\text{OH}\cdot\text{CH}_2\cdot\text{SO}_3\text{Na}$, $\text{OH}\cdot\text{CMe}_2\cdot\text{SO}_3\text{Na}$, are claimed. N. H. H.

Drying org. substances [tobacco].—See I. Acridinium compounds.—See III.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Colloid-free silver halide layers. LÜPPO-CRAMER (Z. wiss. Phot., 1937, 36, 265—268; cf. B., 1937, 982).—Tests of sedimentation from AgBr sols on the plates at varying depths again show that the finer-grained AgBr layers, without gelatin, are the more sensitive. The effects found previously with dyes are recalled, and it is noted that basic dyes cause coagulation of the AgBr to large particles and non-homogeneous layers which are less sensitive; acid dyes (erythrosin) mix with the sol without affecting it. J. L.

Silver bromide layers of low gelatin content. (Schumann plates for photographing the ultra-violet.) LÜPPO-CRAMER (Phot. Ind., 1937, 35, 1109—1111, 1133—1134).—The author's type of large-grained, unripened emulsions, when prepared with very little gelatin (*i.e.*, diluted) and coated on plates by sedimentation, give sensitive layers but overwhelming fogging. Fine- and medium-grained emulsions of the diapositive type, prepared with little gelatin, give plates of the Schumann type, sensitive and not fogging. It is concluded that large grains do not adsorb gelatin well, and so are not "protected." J. L.

Relation of the photographic image formation to the composition of various developers for papers. E. SCHLOEMANN and E. TRABERT (Phot. Ind., 1937, 35, 1183—1184, 1186, 1188, 1208, 1210, 1212).—Photomicrographs are given of sections of a photographic paper developed by surface-acting metol- K_2CO_3 , deep-acting quinol- K_2CO_3 , quinol-2.6% NaOH, quinol-5% NaOH, and normal metol-quinol- Na_2CO_3 developer; the first traces of image appear in 5, 30, 5, 2.5, and 10 sec., respectively, and the image is fully developed down to the support in 2, 3, $1\frac{1}{2}$, $\frac{3}{4}$, and 2 min., respectively. Various other comparisons are made. The various actions are also illustrated by comparing the characteristic curves obtained at each stage of development with each developer. The mode of action of a reversal development is also shown. J. L.

Influence of the acid radical in developers. J. SOUTHWORTH (Brit. J. Phot., 1937, 84, 711—713).—Metol developer prepared without KBr gives high fog; drastic reduction of the Na_2SO_3 (AgBr solvent) reduces the fog; addition of NaCl depresses AgBr solution, and hence reduces fog. $p-NH_2 \cdot C_6H_4 \cdot OH \cdot HCl$ developer (also made without KBr) does not fog, as NaCl forms by reaction of this developer with the alkali. NaCl action is, of course, weaker than that of KBr, which is indispensable in a good developer. The acid radical is therefore specifically important, and the val. of supplying metol as its sulphate is hence questioned. J. L.

Developing trial with a 12-year-old developer solution. H. BÄCKSTRÖM and R. JOHANSSON (Phot. Ind., 1937, 35, 1132).—One of several developers prepared by Hertzberg in 1925, as conc. solutions designed to withstand long keeping, has been tested in comparison with fresh developer of the same formula. The results are practically identical. The following formula is used: 25 g. of Na_2SO_3 (cryst.),

18 g. of amidol, and 15 g. of adurol are added to 270 c.c. of boiling H_2O ; when boiling has ceased (heating stopped), 45 g. of $K_2S_2O_5$ are added, followed by 36 g. of NaOH, dissolved in 30 c.c. of warm H_2O , and the whole is shaken. Then 0.2 g. of pinacryptol-green is dissolved in the min. amount of hot H_2O , and mixed with the rest; 3 g. of KBr are subsequently added. The product must be kept in well-filled, tightly-stoppered bottles. J. L.

Senseless fine-grain developer formulæ. ANON. (Phot. Ind., 1937, 35, 1207—1208).—All the best fine-grained developers act by their solvent action and by the relatively low alkali content and consequently low developing energy; $p-C_6H_4(NH_2)_2$ also acts mainly by the first property. Formulæ proposed by Champlin contain a no. of unusual but useless compounds, and are not effective. J. L.

Effect of temperature on production of the latent image by hydrogen peroxide. M. W. JONES and J. M. BLAIR (Phot. J., 1937, 77, 618).—Photographic plates were immersed in $\frac{3}{8}\%$ H_2O_2 solution at 1°, 11°, 21°, and 31°, successive portions receiving progressively longer time of immersion. A graph is given of density (D) plotted against log immersion time. Curves similar to light-exposure curves are shown at the three lower temp.; at 31°, increase of D is rapid and the emulsion was dissolved off after 16 min. action of H_2O_2 . Plotted against direct times, the factor for increase in nett reaction rate for 10° temp. differences was 1.7 from 1° to 11° and 11° to 21°, but 6.7 from 21° to 31°. J. L.

Photographic sensitivity—the latent image and its development. J. H. REINDORF (Brit. J. Phot., 1937, 84, 658—659, 674—676, 693—694).—A review is given of current hypotheses of the latent image, development, and dye sensitising. J. L.

Determination of spectral sensitivity of photographic negative emulsions. R. RICHTER (Z. wiss. Phot., 1937, 36, 251—265).—Three orthochromatic and three panchromatic commercial brands of plates have been tested by exposure to monochromatic light obtained by passing the light from different metal-vapour discharge tubes through suitable dye-gelatin filters. The energy of the light was measured for each λ with a vac. thermoelement, or the intensity by a visual photometer. Tables and graphs are given for the sensitivity as the reciprocal of (1) the energy of light to give a density 0.1 above fog level, or (2) intensity to give the same density. All the curves show min. sensitivities at 5000 Å. A standard amidol developer was used. Changes in γ are tabulated. The results are accurate to $\pm 20\%$. From the results it is possible to ascertain the optimum filter for general use with each brand of plate, to give more const. sensitivity in relation to intensities. J. L.

The Sabbattier effect. A. MARRIAGE (Phot. J., 1937, 77, 619—625).—Dyed emulsions (both a commercial and a special iodide-free emulsion), in which an image can be confined to the top layer, were washed free from sol. bromides before the second exposure, and it was then found that the Sabbattier effect was absent when the second exposure was made

through the back of the plate; hence optical screening by the first image is indicated as the primary cause of the effect. Assuming it to be the only cause, a method of calculation of expected reversal densities is evolved, when using the method of crossed wedges (one step being opaque so that a strip was obtained with no first exposure, thus giving data for the curve for the second exposure only). The density of a developed, but not fixed and dried, image is \gg after the latter treatments, and a correction was applied to the first density in making the calculations. Calc. and observed results then show good agreement. Experiments with plates coated with a highly-sensitive AgBr-AgI emulsion showed some deviations, but the presence of AgI, considering certain correction factors, appears to have little effect. J. L.

The Eberhard effect. J. JUNKES (Z. wiss. Phot., 1937, 36, 217—234).—The original Eberhard effect (that the photographic density of one area is influenced by that of a closely adjacent area) and related effects such as "edge effect," "fringe effect," and "Kostinsky effect," are discussed; starting from basic principles, the various effects are derived from consideration of the flow of developer within the emulsion. At high-density edges, reduction compounds diffuse outwards and retard development of unexposed areas which yet have a fog level; fresh, unused developer will diffuse in the opposite direction, giving enhanced edge densities. Various degrees of overlapping of areas of varying diameter account for all the principal effects. The phenomena are classified and named as follows: (a) fog effects, due to general weakening of developer by plate fog; (b) effects due to developer movements outside the plate, *i.e.*, "developer" and "KBr" striations, due to currents of fresh developer and reduction products, respectively, where insufficient stirring occurs; (c) effects due to developer movements inside the plate, *i.e.*, "edge effect" (increased density at edge of high-density areas), "fringe effect" (decrease of fog at areas just outside high-density areas), "diameter effect" (increase of mean density or decrease of mean fog in lines of diameter $<$ the range of the "edge" or "fringe" effects), and the "Kostinsky effect" (apparent separation of close centres of density, as noted in twin-star photographs, due to special, unsymmetrical conditions of the "edge" or "fringe" effects). J. L.

"Kodachrome" process of colour photography by subtractive synthesis. L. LOBEL and R. AUVILLAIN (Bull. Soc. Franç. Phot., 1937, 24, 173—182).—A review is given of the processes in the relevant patents and of the methods of development and other treatments of the film. J. L.

Desensitisation [of photographic plates] by pressure. LÜPPO-CRAMER (Kolloid-Z., 1937, 81, 222—225).—Gelatin-free films of Ag halides on glass plates, when subjected to direct (non-shearing) pressure, show lighter markings on development. This effect is produced whether the pressure is applied before or after exposure, and is due to mechanical compaction of the initially highly dispersed grains. In a gelatin-Ag halide plate, however, the effect is shown only when the pressure precedes exposure to

light, and is therefore a true desensitisation. It is attributed to a lowering of the dispersity of the catalytic nuclei, the presence of which distinguishes a gelatin-halide emulsion from the bare halide.

F. L. U.

Gloss measurement.—See I. **isocyanine sensitizers.**—See III. **Cameras for measuring detonation rates in explosives.**—See XXII.

See also A., I, 626, **Ag-nucleus theory of the latent image.** **Photolytic Ag in AgBr-gelatin emulsions.** 627, **Theory of Lippmann's colour photography.**

PATENTS.

Photographic print-out emulsions. KODAK LTD., Assees. of G. E. FALLESEN and C. J. STAUD (B.P. 471,366, 2.3.36. U.S., 2.3.35).—Print-out emulsions are made by pptg. AgOH from AgNO₃ and aq. NH₃ solutions, redissolving the ppt. in an org. base (C₅H₅N), and repptg. the Ag as halide, in presence of gelatin, with an alkali halide. Cellulose acetate phthalate, or other cellulose ester, in an org. solvent, may be used in place of the gelatin. CH₂Br·CO₂H may be employed in place of KBr etc., to ppt. the AgBr. The emulsion may be ripened after addition of extra AgNO₃ solution, and NaNO₂ may also finally be added; these admixtures increase the sensitivity. Emulsions of this type give good contrast and are 50—100 times as sensitive as the usual print-out papers. The images obtained after exposure will fade if kept in actinic light, but may be protected by covering with a transparent yellow layer after printing. J. L.

Actinometer papers. KODAK, LTD., Assees. of J. C. VILLE (B.P. 471,392, 17.6.36. U.S., 26.7.35).—An actinometer paper is formed by imprinting a design (*e.g.*, a letter), by means of a dye, on a print-out paper, the dyed area also being treated with a substance [*e.g.*, a S compound such as CS(NH₂)₂, Na₂S₂O₃, etc., or KBr, KI] which inhibits the formation of a photographic image. The inhibitor and dye may of course be mixed in solution; a suitable colour is formed by a mixture of tartrazine and malachite-green. J. L.

Treatment of wood surfaces for photographic reproduction thereof. L. J. PEARSON, ASSR. to PHILCO RADIO & TELEVISION CORP. (U.S.P. 2,050,118, 4.8.36. Appl., 4.4.36).—To show up the grain of wood and render it more strikingly contrasty for photographic reproduction, the surface is freed from sap and rendered more strikingly contrasty for photographic reproduction, the surface is freed from sap (with 8—12% aq. NaOH), washed, and dried; it is then bleached with H₂O₂, dried, and further bleached with aq. NH₃. When dry it is sanded, brushed, a colourless coating (shellac and gum in EtOH) applied, and the grain finally filled with a filler coloured with *e.g.*, sienna. J. L.

Manufacture of a photomat. D. M. BARNES and H. D. DWIGHT (U.S.P. 2,061,930, 24.11.36. Appl., 8.7.35).—A card is coated with a film containing dichromate which initially (and finally) has the property of swelling at the temp. of molten type metal. The film is sensitised and then exposed to the design,

the sol. unexposed parts are removed, and the remaining parts of the film are "neutralised" (treated with alkali carbonates or org. acids) to restore the property of swelling with heat. The card is then used directly as a matrix.
B. M. V.

Photographic reproduction. L. SZIGETI (B.P. 471,360, 2.3.36. Hung., 1.3.35).—A colour-selection negative of the parts of a picture of any given shade is made by photographing the picture so that the parts required are exposed to give an image of medium density. The image is developed, but not fixed, and is then exposed to light so that lighter areas become fully darkened, whilst the required areas, protected by the surface Ag image, are not substantially affected (darker areas are, of course, unchanged); the plate is then redeveloped and fixed. A print from this negative then records the required areas as a medium-density image, other areas remaining substantially white.
J. L.

Colour photography. D. A. SPENCER (B.P. 470,855, 23.1.36).—Prints on multicolour screen material are developed with a developer containing a retarding or inhibiting agent, *e.g.*, 0.5–6% of $\text{Na}_2\text{S}_2\text{O}_3$, Na_2S , or an iodide, etc., which becomes gradually exhausted as the developer penetrates the emulsion. The top layers yield stable complex salts or undevelopable Ag compounds with the retarder, and the $[\text{Ag}^+]$ is lowered; the developer therefore reacts only with lower layers and the image is formed close to the support, which diminishes desaturation of the colours.
J. L.

Production of coloured photographic images by development. H. D. MURRAY and D. A. SPENCER (B.P. 470,074, 6.2.36).—Two latent images situated one above the other in one or more superimposed emulsion layers on the same side of a support are developed to different colours by first developing the top layer only with a surface colour developer, washing, and then developing the lower layer with a second colour developer containing a small amount of a substance reducing the concn. of free Ag^+ , preferably $\text{Na}_2\text{S}_2\text{O}_3$ (KCN or sol. iodides), which restricts development to layers near the support. Alternatively, the top layer may have been developed with a loaded energetic developer to form a Ag image which is subsequently toned or dyed; both images may first be developed ordinarily, and fixed, and then bleached and colour-developed as above. The developed Ag images are finally removed by bleaching, fixing, and washing, leaving only the two superimposed dye images.
J. L.

Colour photography and cinematography. J. EVANS (B.P. 470,914, 20.1. and 21.4.36).—A film carries two or three emulsions (two on one side), at least two of which are bodily dyed with a dye complementary in colour to the light-sensitivity of each layer, respectively. After development and reversal, the dyed layers are bleached and mordanted (with, *e.g.*, CuSO_4 , KSCN, K citrate, and glacial AcOH), thus leaving non-image areas colourless, and the undyed layer is dyed the required colour. With only two emulsions, the blue-green-sensitive layer may be dyed yellow, and after processing be dyed with magenta

dye to give red reversed images. Kinema film bearing two part images per frame may be printed by projection to give pictures of full frame size in complete colour.
J. L.

Natural-colour photography and cinematography. K. STEINER and H. SEYRICH (B.P. 469,759, 25.10.35).—Film adapted to receive two adjacent identical images is constructed so that one emulsion sensitised to two colours, *e.g.*, red and green, covers both picture areas, and a second emulsion, sensitive to a third (*e.g.*, blue) colour, covers only one picture area, a suitable (*e.g.*, red) filter being placed between the two emulsions. A second, *e.g.*, green, filter may cover the other half of the first emulsion. The picture division may be longitudinal or transverse; the emulsions may be on the same side or on opposite sides of the support.
J. L.

Colour table for testing the correctness of colour or sensitisation in colour photography. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 473,422, 6.3.36).

XXII.—EXPLOSIVES; MATCHES.

Stabilising power of various compounds [used in explosive powders] as determined by the Taliani and Thomas stability tests. M. TONEGUTTI (Z. ges. Schiess- u. Sprengstoffw., 1937, 32, 300–305).—The effects of 0.5–7.0% of *s*- and *as*-centralite, diphenyl- and phenylethyl-urethanes, phthalide, diamyl and Bu_2 phthalates, NH_2Ph , acardit, anthracene, NHPh_2 , and vaselines of various Br val. on the stability of nitroglycerin and nitrocellulose, as determined by the Taliani and Thomas tests, are tabulated. Of the gelatinisers, *s*-centralite has the highest stabilising action, the urethanes have a comparatively weak action and should be mixed with a stronger stabiliser, *e.g.*, acardit, and phthalide and the phthalates have no sp. effect. Mixtures of substances having a combined gelatinising and stabilising action and those having only a stabilising action are more effective than their components. Of the stabilisers, NHPh_2 and acardit are the best, the former especially with nitroglycerin and the latter with nitrocellulose. The above substances, as well as NH_2Ph , have no hydrolysing action on the explosive except at high temp. remote from those reached in practice and on prolonged treatment. The centralites especially have a very slight basic reaction. Anthracene is a stabilising and cooling agent with considerable stabilising power and has no hydrolysing action at high temp. Vaseline with a high Br val. gives higher stability than the more fully saturated products. The Taliani test is unreliable for comparing stabilities of powders with different stabilisers, because the high temp. of the test causes various side reactions.
W. J. W.

High-speed cameras for measuring the rate of detonation in solid explosives. W. PAYMAN, W. C. F. SHEPHERD, and D. W. WOODHEAD (Safety in Mines Res. Bd., 1937, Paper 99, 22 pp.).—Two cameras are described: in one the photographic film is mounted inside a rotating drum, having a max. writing speed of 175 m./sec.; in the other, the image

is moved along a stationary film by a rotating mirror and has writing speeds up to 352 m./sec. Traces obtained with the latter type of camera under various conditions are reproduced. A. R. PE.

Calorimetric studies of transformations taking place in nitrocellulose powders. W. SWIENTOSŁAWSKI, T. URBAŃSKI, H. CAŁUS, and M. ROSIŃSKI (Rocz. Chem., 1937, 17, 444—453).—Nitrocellulose gunpowders (20—30 years old) do not evolve heat when stored at room temp. After heating at 75° a small, gradually diminishing heat production was found; a second heating changed the effect into a progressively increasing one. R. T.

Detection of yperite. J. HÖKL and V. KARHÁNEK (Chem. Obzor, 1937, 12, 134).—The reagents of Mayer and Dragendorff are more sensitive for yperite (I) than is the I—KI test; the most sensitive is the Grignard reagent, which detects 0.08 g. of (I) in 1 litre of EtOH. F. R.

Explosivity of systems containing $KMnO_4$.—See VII.

See also A., 1937, II, 480, **Characteristic reaction of yperite.**

PATENTS.

Flashless powder charge. R. G. WOODBRIDGE, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 2,050,871, 11.8.36. Appl., 1.2.34).—The bag containing the propellant powder is wrapped in a silk bag impregnated with a flash-suppressing alkali salt, e.g., with K_2SO_4 and starch. A. R. P.

Smoke bombs or projectiles. I. G. FARBEN-IND. A.-G. (B.P. 472,089, 10.9.36. Ger., 6.11.35).—The charge of a bomb, especially for practice, comprises fuming H_2SO_4 , NaCl, and a Cr^{VI} compound (or other mixture) adapted to form CrO_2Cl_2 and heat to volatilise it. B. M. V.

Manufacture of safety fuse. J. S. B. FLEMING, W. S. DENNLER, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 471,433, 3.3.36).—A binder, which enables the drawing operation to be carried out at a greater speed than when silicate varnish is used, consists of a cellulose ether or ester (methyl- or glycol-cellulose), which is insol. in H_2O , and sol. in aq. NaOH but preferably not completely so by simple mixing at normal temp. W. J. W.

Propellant cartridge. FEDERAL LABORATORIES (B.P. 473,754, 19.2.36. U.S., 11.12.35).

XXIII.—SANITATION; WATER PURIFICATION.

Use of lithium chloride for air-conditioning. F. R. BICHOWSKY (Foote Prints, 1935, No. 2, 1—7; cf. B., 1935, 976).—A review. LiCl can be used to dehumidify down to 11% R.H. Its drying rate is > that of $CaCl_2$, and the conc. solution does not solidify until below -50° . Corrosion is < that for $CaCl_2$, and pptn. due to absorption of CO_2 does not occur. CH. ABS. (e)

Destruction of air-suspended bacteria by irradiated substances. M. BECHOLD (Z. Hyg., 1937, 119, 193—212).—Many org. substances (notably essential oils) examined produced peroxides on irradiation with ultra-violet light. Bactericidal action of such substances was unrelated to their peroxide contents. In many cases "ageing" of irradiated substances, resulting in diminished bactericidal activity, occurs. A. G. P.

Aërosols. Dust, smoke, fog, clouds, and air pollution as problems relating science, economics, and health. H. W. LOHSE (Canad. Chem. Met., 1937, 21, 340—342). A. G.

Dust control in industry. (A) J. D. LEITCH and L. B. LEPPARD. (B) H. V. A. BRISCOE (Nature, 1937, 140, 772—773, 773). L. S. T.

Ocular micrometer for dust-counting. R. T. PAGE (U.S. Publ. Health Rep., 1937, 52, 1315—1316).—A ruled grid (3.5 mm. square, divided into 25 small squares) instead of the Whipple micrometer (7-mm. square) is suggested. W. L. D.

Dosage—mortality curve of pyrethrum sprays on the house-fly (*Musca domestica*). D. HOYER, S. Z. VON SCHMIDT, and A. WEED (J. Econ. Entom., 1936, 29, 598—600).—Toxicity data are recorded. A. G. P.

Comparison of tetrahydronaphthalene and ethylene dichloride-carbon tetrachloride mixtures against clothes-moth larvæ. W. COLMAN (J. Econ. Entom., 1936, 29, 629—630).—Tetrahydronaphthalene was more effective than $C_2H_4Cl_2-CCl_4$ (3 : 1) when compared on an equal vol. basis. A. G. P.

Toxic action of chlorinated hydrocarbons. Risks of poisoning in their manufacture and use. R. FREITAG (Rayon Text. Month., 1937, 18, 543—545).—The Cl-derivatives from C_2H_6 are more toxic than those from CH_4 ; those derived from C_2H_4 are intermediate in their toxicity. This property decreases with increasing Cl content. Masks should be used in closed spaces containing CCl_4 or C_2HCl_3 . A. G.

Two outbreaks of food poisoning. J. C. GEIGER (U.S. Publ. Health Rep., 1937, 52, 765—772).—Two outbreaks, one due to *Staph. aureus* in cream custard cakes (110 cases) and the other due to *Cl. botulinus* in canned antipasto (10 cases), are reported. The effect of intravenous injection of hypertonic solutions of glucose in cases of botulism is discussed. W. L. D.

Comparison of sewages of Ohio municipalities on basis of oxygen requirement per capita per day. B. M. MCDILL (Sewage Works J., 1937, 9, 763—768).—Evaluation of the O_2 required (as lb. per capita per day) is recommended for comparisons as it should be const. for a sewage contributed by a fixed population in spite of variations in vol. and 5-day biochemical O_2 demand. It is affected by trade waste and street washings. O. M.

Adjustment of the p_H value of sewage by means of carbon dioxide. T. CHUJO (Sewage Works

J., 1937, 9, 750—762).—Adjustment of sewage to p_{H_2} 7.0 when alkaline trade wastes are present reduces the aëration period and the air consumption, and improves the effluent, especially with the activated-sludge process. The CO_2 of digester gas before or after burning is recommended for this purpose on account of its cheapness. O. M.

Clarification of activated sludge. III. Carbon dioxide production during the clarification and oxidation stages of activated sludge. H. HEUKELEKIAN and R. S. INGOLS (Sewage Works J., 1937, 9, 717—727).—Measurement of CO_2 production during the aëration of activated sludge-sewage mixtures is more suitable for determining the load on aëration tanks than biochemical O_2 demand, as it measures the oxidation of org. matter by the highly specialised organisms of activated sludge under const. agitation, whilst the biochemical O_2 demand measures only the O_2 consumed by org. matter in the quiescent state in presence of sewage organisms. The highest rate of CO_2 production in normal curves occurs during the initial period, and the duration of this period depends on the strength of the sewage. The results emphasise the dependence of the clarification stage on oxidation and that the biochemical oxidation systems of activated sludge react rapidly without lag with proper stimulation in presence of food and air. (Cf. B., 1937, 847.) O. M.

High- and low-temperature digestion experiments. IV. Effects of certain toxic wastes. W. RUDOLFS (Sewage Works J., 1937, 9, 728—742).—Under mesophilic conditions comparatively small quantities of $CuSO_4$, Na_3AsO_4 , acids, petrol, and oil inhibit digestion, affecting gasification to a greater extent than liquefaction. Gas production may increase with small quantities of engine oil, but complete digestion takes a longer time. Additions of all wastes increase odour. Sludge mixtures could be acclimatised only to a limited extent. Under thermophilic conditions, sludge mixtures were more sensitive to poisons ($CuSO_4$, Na_3AsO_4), but less so to oils and acids, than similar mixtures at low temp.; the digestion time was shorter, but less gas was evolved, the odours were intensified although less H_2S was present in the gas, and the drainability of the digested mixtures was poorer. (Cf. B., 1937, 1413.) O. M.

Aëration tanks for activated-sludge [sewage] plants. S. W. FRIESE (Proc. Amer. Soc. Civ. Eng., 1937, 63, 1535—1555).—Theory and practice governing the design of the diffused-air type of activated-sludge aëration tanks are discussed. The required capacity depends on the quantity of sewage, aëration period, and % return of activated sludge. The min. aëration period and optimum % of return sludge required for "complete treatment" vary with the strength of the sewage treated. Having fixed the required tank capacity, and as the actual depth has little effect on purification, the economical depth may be determined by balancing the cost of compressing air against the fixed charges on tank cost. The ratio of 2:1 for tank width to depth may be used safely. The quantity of air required for "complete treatment" is independent of the degree of preliminary sedi-

mentation and is approx. 0.0045 cu. ft. per gal. of sewage per p.p.m. of 5-day biochemical O_2 demand removed for "spiral flow" types of plant, which require less (about 25%) air than "ridge and furrow" types. Further saving in air and total power required is obtained by supplementing air diffusion by submerged mechanical agitation. Diffusers of higher permeabilities (35—45) can safely be used, since the size of air bubble is not appreciably different from that of less permeable plates, they do not clog so readily, and they offer less resistance to air flow. O. M.

Operation of the San Antonio activated-sludge plant. E. J. M. BERG (Sewage Works J., 1937, 9, 769—776).—The extent of the under-capacity of the existing digestion plant was determined by laboratory tests on sedimentation sludge, activated sludge, and mixtures. Bulking resulted from insufficient air, caused by foul supernatant liquor from the over-loaded digesters, and was cured by excess air. The no. of cu. ft. of air per lb. biochemical O_2 demand load on the primary effluent gives a better understanding of the load on the plant. O. M.

Multiple-stage sewage-sludge digestion. A. M. RAWN, A. P. BANTA, and R. POMEROY (Proc. Amer. Soc. Civ. Eng., 1937, 63, 1673—1699).—Digesting sludge particles float, due to adhering gas, while digested particles and inorg. particles sink. Advantage is taken of this gravimetric segregation in the design to separate and pass ahead the lower strata, allowing the upper active strata to lag, and thereby utilising more fully the tank capacity. The solids that sink are passed to the next tank successively through the battery, and this multiple-stage digestion enables a study of the component phases to be made. The operating data are discussed and show an average over 4 years of 47% reduction in org. matter with a 12-day detention period. Mechanical agitation is unnecessary, and heat is neither absorbed nor liberated during the process. The chemical studies indicate the benefit of large concn. of Fe salts in keeping the H_2S content of the gas low, that no N is lost during digestion but that a portion is rendered sol. in the liquor, and that 47% of the gas production occurs in the initial stage. O. M.

Activated carbon—its place in sewage treatment. R. W. HAYWOOD, jun. (Sewage Works J., 1937, 9, 785—794).—Control of odour, p_{H_2} , and scum formation, and an increased speed of digestion are claimed to result from the addition of activated C to the digestion plant, and also the control of bulking in the activated-sludge plant. The dose depends on various factors, but averages 4 p.p.m. O. M.

Effect of stirring of sludge on vacuum filtration. C. E. KEEFER and H. KRATZ, jun. (Sewage Works J., 1937, 9, 743—749).—Experiments indicate that stirring of raw, semi-digested, and digested sludges both prior to and after coagulation reduced the rate of filtration, which became more difficult with increased stirring. Raw sludge became more difficult to filter if left quiescent after coagulation, whilst semi-digested and digested sludge improved. O. M.

Self-purification and artificial biological purification of sewage. K. VIEHL (Z. Hyg., 1937, 119, 383—412).—Each stage of the natural self-purification process (decomp. of org. matter, NO_2' and NO_3' production) corresponds with a max. period of development of ciliates. In sterile and enzyme-free waters oxidation is small and no flocculation of colloids occurs. In normal effluents under aerobic conditions the protozoan flora is $>$ that in sludge or in soil and is largely responsible for flocculation of colloids. Under anaerobic conditions the nos. of protozoa are too small to be of importance in self-purification. Diminution in O_2 requirement during purification is equally rapid in anaerobic and aerobic conditions. Protozoa-free activated sludge effects only partial flocculation of colloids. A. G. P.

Hygienic aspect of the London water supply. C. H. H. HAROLD (J. Soc. Arts, 1937, 85, 1085—1096).—London's H_2O is traced from its origin, outlining the purification by the "biological carpet of the river bed," which action is fostered by storage and double filtration. Chemical adjuncts are used in emergency to control the biological life of the mature purified H_2O , and for terminal elimination of any residual pollution. Const. bacteriological, biological, and chemical examination at all stages ensure a first-class palatable H_2O . O. M.

Survey of the River Tees. III. The non-tidal reaches—chemical and biological. R. W. BUTCHER, J. LONGWELL, and F. T. K. PENTLOW (Dept. Sci. Ind. Res., Water Pollution Res., 1937, Tech. Paper No. 6, 189 pp.; cf. B., 1936, 78).—The non-tidal portion of the River Tees can be considered in two sections: (1) the 55 miles above Croft Bridge, having a soft, slightly alkaline H_2O (except from peat during floods), of fairly const. composition, and practically unpolluted except very locally by small sewage works; and (2) the 24 miles below Croft Bridge, at which both chemical and biological characteristics change, due to the entry of very hard, heavily sewage-polluted H_2O of the R. Skerne. The chemical composition varies continually through decomp. of the sewage, and the rate of which decomp. varies with the temp. and produces a proportionate reduction in the dissolved O_2 , and although self-purification occurs this section remains polluted. The effect of pollution on microflora is marked, the *Achnanthes-Chaetopeltis* group characteristic of fresh H_2O being replaced by *Cladophora*, *Navicula viridula*, *Cocconeis*, and *Sphaerotilus natans* characteristic of polluted H_2O . The seasonal variations in chemical composition (NH_3 , NO_2' , NO_3' , dissolved O_2 , etc.) causing seasonal effects on plant life (microflora, algæ, fungi, etc.), which in turn affect animal life (bacteria, larvæ, etc.), have been studied, together with diurnal variations caused by the effect of daylight. Laboratory experiments show that undiluted fresh domestic sewage was toxic to trout, but became less toxic and even harmless by dilution with clean H_2O provided sufficient dissolved O_2 was maintained. Septic sewage is very poisonous even after dilution, owing to H_2S . O. M.

Composition of the effluent water at Oporto. A. LAROZE (Rev. Chim. pura appl., 1936, 11, [iii],

139—153).—Analytical data are recorded for a period of 12 months. The methods employed are described.

Modification of the palmitate determination of magnesia in water. P. HAMER and H. E. EVANS (J.S.C.I., 1937, 56, 441—442T).—In the determinations of hardness by the Blacher (palmitate) method, it has been usual to ppt. the Ca hardness with $\text{Na}_2\text{C}_2\text{O}_4$ and to titrate the remaining Mg hardness against K palmitate (I). The end-point of this titration has been found to be indefinite. If the Mg hardness is pptd. and the remaining Ca hardness titrated against (I), the end-point is much more definite, a series of results on mixtures of solutions of Mg and Ca salts showing that the error is usually <0.5 pt. of $\text{CaCO}_3/10^5$; the Mg hardness is then found by subtracting the Ca hardness from the total hardness previously determined.

Determination of traces of heavy metals in mineral waters. II. K. HELLER, G. KUHLA, and F. MACHEK [with W. SACK, G. J. ZELLNER, and F. STEIN] (Mikrochem., 1937, 23, 78—115; cf. B., 1936, 46).—The mineral H_2O , with or without previous concn., is treated with dithizone in CCl_4 to separate the metals. The latter are dissolved in HCl, org. matter is removed, and the metals are analysed polarographically. Details are given of the prep. of reagents and apparatus for the purpose. Data are recorded for the Cu, Pb, Zn, and Ni contents of H_2O from Carlsbad, Marienbad, and St. Joachimsthal springs. Cd and Co could in no case be detected, whilst only in the last two cases were indications obtained of the presence of traces of Bi. J. W. S.

Removal of fluoride from water. E. ELVOVE (U.S. Publ. Health Rep., 1937, 52, 1308—1314).—F is removed by $\text{Ca}_3(\text{PO}_4)_2$, $\text{Mg}(\text{OH})_2$, or preferably MgO. Light MgO is more efficient (but dearer) than calcined magnesite, whilst the latter, after it has exhausted its F-removing properties, can be used for other industrial (building etc.) purposes. W. L. D.

Sterilisation of drinking water with minimal doses of chlorine. T. N. S. RAGHAVACHARI and P. V. S. IYER (Indian J. Med. Res., 1936, 24, 103—108).—Clear H_2O from wells, galleries, and filter-plants can be sterilised in many cases by $\frac{1}{2}$ — $\frac{1}{10}$ of the optimum ascertained quantities of Cl_2 .

Clarification and simultaneous purification of waste water by means of asbestos. P. ZIGERLI (Génie Civil, 1937, 111, 149—151).—After removing the larger particles by decantation, 2—3 g. of asbestos fibre are added per cu. m. of H_2O and air is blown in. The mixture is passed through a funnel-shaped decanter where the asbestos impregnated with org. matter is retained. The clarified H_2O is further purified by passage through cinder and sand beds. The process is claimed to be superior to the activated-sludge process. R. B. C.

Natural purification in polluted waters. X. Reoxygenation by microscopic algæ. W. C. PURDY (U.S. Publ. Health Rep., 1937, 52, 945—978).—A green alga (*Oocystis*) in sufficient amount to tint H_2O a slight green produced measureable amounts of

dissolved O_2 . Cultures containing algæ and bacteria showed first a decrease and then an increase in dissolved O_2 in media not accessible to atm. O_2 . The alga-made O_2 in aerated cultures is only 10% of that formed in sealed cultures and exposure to air permits the escape of most of the O_2 . W. L. D.

Limited efficiency of the electrokatadyn process for regeneration of bath waters. E. REMY (Z. Hyg., 1937, 119, 263—268).—Chemical and bacteriological data relating to trials of the process are recorded. A. G. P.

Dissolving cellulose derivatives.—See V. **Dust hazards in ceramic industry.**—See VIII. **Fumigating flour mills.**—See XIX.

PATENTS.

Respiratory protection apparatus. W. H. A. THIEMANN. FROM I. G. FARBENIND. A.-G. (B.P. 472,088, 24.8.36).—In a gas mask, the respiratory circuit is closed; part of the O_2 is supplied at a const. rate by thermal decomp. of a compressed moulded substance, and part by Na_2O_2 or the like at a rate depending on the CO_2 present in the exhaled gases. Both substances are in cartridge form. B. M. V.

Preparation of skin foods. R. HELLERUD (B.P. 468,290, 2.10.35).—Milk freed from butter fat and sterilised is emulsified with a fat, e.g., a mixture of wool fat and arachis oil, and then dehydrated and dried. Before dehydration the emulsion may be fermented with an organism, e.g., *B. bulgaricus*, which converts lactose into lactic acid. E. H. S.

Preparations for protection from insects. A. CARPMAEL. FROM I. G. FARBENIND. A.-G. (B.P. 473,592, 7.1.36).—The persistence of insect-repellent mixtures based on coumarin (I) or $o-C_6H_4(CO_2Et)_2$ (II) is increased by dissolving them with a H_2O -sol. alkaline-earth salt in an org. solvent containing <15% of H_2O . Among examples of such mixtures are (I) (10) and $CaCl_2$ (10) in 96% EtOH (80), or (II) (15), $MgBr_2$ (6), $CaBr_2$ (8), and H_2O (10) in Pr^iOH (120 pts.). Similar preps. of stiffer consistency are also claimed. R. S. C.

Embalming composition. H. I. JONES, Assr. to NASELMO CORP. (U.S.P. 2,048,008, 21.7.36. Appl., 4.2.35).—An emulsion of CH_2O in a fatty substance, e.g., lanoline or a mixture of glycol stearate and oxycholesterol, containing a suitable buffer agent, is claimed. E. H. S.

Treatment of sewage. S. I. ZACK, Assr. to FILTRATION EQUIPMENT CORP. (U.S.P. 2,056,062, 29.9.36. Appl., 17.2.33).—A complete treatment, including aeration in several zones and flocculation, is described. Aeration is effected by conveyors taking a triangular course in a vertical plane, pushing the sand to sumps, and elevating the sludge to above liquor level and then lowering it on the sloping course, this aeration being supplemented if necessary

by compressed air through porous diffusers. Flocculation is effected in a separate zone. B. M. V.

Treatment of sewage. TUBE D'ACIER, and R. GANDILLON (B.P. 471,995, 19.5.36. Fr., 22.7.35).—Sewage is subjected to vigorous mixing by blowing with air or other oxidising gas before entering the sewer. Apparatus is claimed. O. M.

Purification of sewage or waste liquors. P. ZIGERLI (B.P. 471,569, 11.6.36. Switz., 20.6.35).—Purification of sewage by a floating filter of asbestos fibres held in a uniformly distributed suspension by air-blowing is claimed. The liquor, or the liquor and asbestos fibres, can be continuously added and withdrawn; bacterial activation occurs on the fibres. When the asbestos becomes saturated a portion can be removed, cleaned, and re-used. O. M.

Apparatus for aerating sewage and the like. P. B. STREANDER, Assr. to UNDERPINNING & FOUNDATION Co., INC. (U.S.P. 2,054,395, 15.9.36. Appl., 8.3.35).—A revolving shaft mounted with a propeller and impeller in a draught tube is claimed for aeration and circulation of sewage by the activated-sludge process. The propeller feeds the liquid upwards to the impeller, designed to turn the liquid gradually outwards through vanes of different curvatures which cascade the liquid in a series of thin sheets at different predetermined distances. O. M.

Sewage-sludge digester. F. FRIES (U.S.P. 2,057,567, 13.10.36. Appl., 2.3.34. Ger., 6.4.33).—A digestion tank is surmounted by a fixed bell from which the axial driving shaft of an agitator is suspended and an inner floating bell forms a gasometer. B. M. V.

Filters [for water]. RICKS, SUTCLIFFE, & BOWDEN, LTD., and E. WHITTLE (B.P. 471,860, 9.3.36).—A granular combustible material (coke) is supported on a sloping perforated plate inclined towards a door through which soiled filter material may be removed, aided if desired by a hydraulic jet, the last being especially useful for unclogging the supporting plate. B. M. V.

Treatment of liquid [river water]. J. F. WAIT (U.S.P. 2,055,808, 29.9.36. Appl., 12.11.32).—Whatever the state of flood in a main river, a portion is caused to flow at a const. slow rate through a reservoir and is subjected to ozonisation and ultrafiltration to produce potable H_2O . B. M. V.

[Construction of] gas masks [with microphone attachment]. J. NICOLAIDI (B.P. 472,897, 25.3.36).

[Electrical] treatment of objects [walls, furniture, etc.] for destruction of insect life. D. CRONSHOE (B.P. 474,187, 16.12.36).

Thermostatic etc. devices. Steriliser [for H_2O]. Centrifugal separator [for sewage]. H_2O -distilling apparatus. Dust collector.—See I. **Gas analysis apparatus.**—See II.