BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

OCT. 10 and 17, 1930.*

I.—GENERAL; PLANT; MACHINERY.

Rapid countercurrent mixer. L. ZAKARIAS (Chem.-Ztg., 1930, 54, 607-608).-The advantages of the Eirich mixer (cf. Beton u. Eisen, 1928, No. 4) for the cement, concrete, and colour industries are confirmed ; it can also be used for dough-like materials and in the manufacture of bread, chocolate, cosmetics, etc.

E. LEWKOWITSCH.

Continuous "unit" rotary filters in the chemical industry. C. ALEXI (Chem. Fabr., 1930, 321-322).-A rotary drum filter of the type in which the slime is sucked against the periphery at one quadrant, dried in the next two and removed, and the filter surface then washed before it re-enters the filtering zone is described A. R. POWELL. and illustrated.

Use of revolving tubes for crystallisation and concentration. M. Evéquoz (Giorn. Chim. Ind. Appl., 1930, 12, 348-352).-Descriptions and diagrams are given of : a rotating tubular crystalliser, in which saline solutions are crystallised, with continuous separation of the crystalline product; a tubular concentrator; and a tubular concentrator-crystalliser, which combines the two forms of apparatus in a single tube and permits the crystallisation of dilute saline solutions in a single phase. T. H. POPE.

Degasification apparatus [for evaporators]. G. BRUHNS (Chem.-Ztg., 1930, 54, 629).-It would seem that, as air and carbon dioxide are heavier than steam and ammonia, connexions for the removal of the first two from steam chests should be at the bottom, and for the ammonia at the top. In practice, however, the effect of density is often neutralised by diffusion and turbulence. If "dead angles" exist, this is where the connexions should be placed. The question is of importance in relation to the corrosion of steam tubes, but the solution depends on the design and even on the method of operation of the evaporator. C. IRWIN.

Application of a modern turbine for the utilisation of steam used in the production of [ammonium] sulphate. F. REUTER (Gas- u. Wasserfach, 1930, 73, 361-364).-The possibility of using waste steam from the ammonia evaporators in a turbine for the generation of electrical current is discussed, and figures are given showing the economies thereby effected in the cost of production of ammonium sulphate from dilute ammoniacal liquors produced in a gasworks.

A. R. POWELL. Determination of lustre. Anon. (Jahresber. VII., Chem.-Tech. Reichsanst., 1928, 220-222; Chem. Zentr., 1930, i, 1976-1977).-An apparatus and unit of measurement are described. A. A. ELDRIDGE.

Checking flue-gas analyses. HERTZELL. Moisture loss in kilns. BLESSING. Compensator for pyrometer installations. ARNOLD.—See VIII. Fast-ness of colours. STERN.—See XIII. Treatment of boiler waters. BARTOW.-See XXIII.

See also A., Aug., 1014, Viscosimeter (Kämpf and SCHRENK).

PATENTS.

Heat exchangers for abstracting heat from waste furnace gases. F. K. WOODROFFE (B.P. 333,397, 14.8.29).-The heat is transferred to both air and water simultaneously. One form of the apparatus comprises a casing set above a flue in which are dampers to divert the flue gases upwards into the exchanger and downwardly out into the same flue. The air is heated in a number of narrow casings dependant from the roof, and between the air passages are vertical rows of pipes for water. Zig-zag and generally countercurrent flow is B. M. VENABLES. arranged for.

Heat-exchanging apparatus. HEENAN & FROUDE, LTD., and G. H. WALKER (B.P. 331,602, 10.1.30) .- A tubular heat-exchanger is provided with cores con-sisting of metal ribbon slit and twisted, to produce turbulence of the fluid. B. M. VENABLES.

Heat-exchange apparatus. [Radiator.] C. E. SAFFORD, Assr. to A. H. GREELEY (U.S.P. 1,753,318, 8.4.30. Appl., 12.5.25) .- A deeply corrugated structure is formed by pressing and welding (or brazing) sheet metal, the form being such that the operation of pressing produces bending, but no stretching, of the metal.

B. M. VENABLES.

Generation of steam from waste industrial gases, particularly in water-gas plants. SEMET-SOLVAY ENG. CORP., Assees. of F. W. STEERE (B.P. 333,472. 13.11.29. U.S., 17.11.28).—The waste gases are passed through a heat-absorbing medium over which water is afterwards sprayed. The superheated steam produced is passed into a supply of water and produces a further volume of steam, the combined steam being saturated ; the water thus heated is preferably used to supply the sprays. The apparatus forms a convenient means for generating the steam required for water-gas producers from the waste heat of the "blow" period alone. B. M. VENABLES.

Washing waste or chimney gases, in connexion with steam-generating plants, blast furnaces, etc. T. CARTWRIGHT (B.P. 333,317, 21.5.29) .- A number of inclined annular shelves and conical trays are arranged alternately and overlapping within a tower, the gas passing upwards round their inner and outer edges, respectively. Approximately horizontal water sprays

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

are provided beneath the shelves, and the muddy water is exhausted through a bus pipe leading from the points of the cones. A moisture eliminator is provided at the top. B. M. VENABLES.

Absorption refrigerating machines. SIEMENS-SCHUCKERTWERKE GES.M.B.H., Assees. of SIEMENS-SCHUCKERTWERKE A.-G. (B.P. 316,299, 9.7.29. Ger., 27.7.28).—In consequence of improved gas-tightness obtainable in the present-day machines, hydrogen may be used as the neutral carrier gas in the apparatus described in B.P. 229,332 (B., 1926, 519). [Stat. ref.] B. M. VENABLES.

Vessels of the autoclave type. G. MONETA (B.P. 310,852, 1.5.29. It., 1.5.28).-A vessel, more particularly of domestic size, is formed with a mouth turned inwardly and then outwardly, presenting a channelled surface convex to the interior, against which the lid is held by the internal pressure. B. M. VENABLES.

Comminuting mills. ALLIS-CHALMERS MANUF. Co., Assees. of R. C. NEWHOUSE (B.P. 333,061, 16.8.29. U.S., 20.12.28).-In a rotary drum mill divided transversely into at least two compartments, the material from an earlier stage of grinding is admitted to the interior of an annular screen rotating with the drum. The undersize passing the screen is delivered (e.g., by scoops) to the next later compartment, and the oversize retained in the screen is moved by a conveying device to a hollow tyre, by which it is returned to the earlier compartment. B. M. VENABLES.

Drying of granular materials. C. MOORE & Co., LTD., W. M. SHAW, and W. TRANTOM (B.P. 332,788, 5.9.29).-A number of trays or plates of stainless steel or monel metal are inclined alternately from opposite walls of a tower at an angle steeper than that of repose of the salt or other material being dried. Cams are rotated under the plates to shake them and their motion is limited by rods extending from them to outside the tower, where springs are provided.

B. M. VENABLES.

Apparatus for treating and mixing comminuted or finely-divided materials. A. B. and C. R. SMITH (B.P. 333,051, 2.8.29).-In an apparatus of the type in which rotating arms or sweeps act in conjunction with fixed or relatively moving surfaces, one of the elements is resiliently supported in such a way that it is normally rigid but can yield to exceptionally hard bodies.

B. M. VENABLES.

Centrifugal separator. E. VAN DER MOLEN (B.P. 333,452, 11.10.29).-A centrifugal separator of the straining type has the basket divided into a number of compartments into which the feed is admitted in sequence, and from which the collected solids are removed by a scraper which enters each one in turn without slowing the machine or affecting the operation of the other compartments. B. M. VENABLES.

Centrifugal separation. H. S. COE (B.P. 332,993, 28.5.29).—In a centrifuge with continuous discharge of both products, an additional carrier or diluting liquid is delivered to the zone of discharge of the heavier product by means of a pump device comprising an inverted hollow cone rotating with the centrifuge and dipping nto a tank of the carrier fluid. The amount of dilution

is regulated by permitting more or less of the carrier fluid to pass unused through adjustable ports provided in the conical wall of the pump. B. M. VENABLES.

Centrifugal apparatus for treatment of gases, vapours, liquids, etc. M. AURIG and G. BRÜCKLMAYR (B.P. 333,399, 14.8.29).—A number of discs are rotated on a horizontal shaft; there are no alternate fixed discs, but the rotating discs have projections arranged in curved lines which are interrupted, the projections of each disc intercalating with those on its neighbours.

B. M. VENABLES. [Stationary] centrifugal apparatus. J. M. SCHUTZ, Assr. to Centrifix Corp. (U.S.P. 1,753,972, 8.4.30. Appl., 3.3.25).-A multi-tuyèred device suitable for the production of rapid rotary motion in a fluid is constructed of a number of castings all alike. (Cf. U.S.P. 1,539,435; B., 1925, 578.) B. M. VENABLES.

Centrifugal baskets. E. ROBERTS, Assr. to WES-TERN STATES MACHINERY Co. (U.S.P. 1,753,023, 1.4.30. Appl., 6.4.28).-The clogging of the liquor outlet holes of the basket and the openings of the grid supporting the filtering elements can be prevented by elongating the holes in a circumferential direction and bevelling their edges so that acute angles are formed at the inner surface, and so fixing the grid that the rear boundaries of the holes are slightly behind those of the grid openings. D. K. MOORE.

Tubular filters for air and gases. F. AMME (B.P. 332,475, 12.10.29. Ger., 12.10.28).-A filter composed of a number of vertical tubular bags, preferably of comparatively small diameter, is kept clean by continuous horizontal vibration of the supporting platforms. B. M. VENABLES.

Centrifugal apparatus for dust extraction. BRIT. "REMA" MANUF. Co., LTD., and P. HOWDEN (B.P. 332,405, 18.7.29).-The apparatus comprises a number of concentric cylindro-conical walls, the stream of gas and dust being admitted tangentially through the outer wall. The only communication to the inner spaces is through ports in the walls (also provided with tangential guides) so that the air or gas is continually directed to a central outlet. B. M. VENABLES.

[Vapour-phase] catalytic apparatus. Selden Co., Assees. of A. O. JAEGER (B.P. 331,468, 4.11.29. U.S., 22.12.28).—In a plant comprising a series of (two) catalyst layers or converters, the first layer is cooled by the entrant gases, the second being cooled independently either by fresh entrant gases or by other gas, preferably re-circulated. Four such plants are figured. C. HOLLINS.

[Boiler-]scale removing and preventing apparatus. G. S. NEELEY (U.S.P. 1,773,274-5, 19.8.30. Appl., [A] 21.11.25, [B] 19.4.26).—See B.P. 264,551 and 287,196; B., 1927, 240; 1928, 390.

Heat-treatment process and apparatus in which a hot liquid mass is employed. C. F. HAMMOND, Assr. to W. SHACKLETON (U.S.P. 1,765,148, 17.6.30. Appl., 1.4.27. U.K., 15.4.26).—See B.P. 278,768; B., 1927, 928.

Centrifugal machines. SHARPLES SPECIALTY Co., Assees. of W. H. BATH (B.P. 330,158, 27.6.29. U.S., 5.12.28).—See U.S.P. 1,750,154; B., 1930, 746.

Mechanical preparation of pulverised solid fuels and like materials. G. S. Lov (U.S.P. 1,774,487, 26.8.30. Appl., 1.12.28. Fr., 9.12.27).—See B.P. 301,887; B., 1930, 403.

Pulveriser. W. A. WHITE (U.S.P. 1,772,974, 12.8.30. Appl., 11.7.29. U.K., 21.8.28).—See B.P. 318,375; B., 1929, 875.

Machine for crushing ore, stone, etc. J. W. ERICSSON (U.S.P. 1,773,616, 19.8.30. Appl., 13.10.27. Swed., 4.11.26).—See B.P. 293,651; B., 1928, 657.

Machinery for grinding, mixing, and like operations. J. H. J. Wood (U.S.P. 1,774,464, 26.8.30. Appl., 24.5.28. U.K., 7.6.27).—See B.P. 291,952; B., 1928, 627.

Atomiser for liquids. R. ELSÄSSER, ASST. to SIEMENS-SCHUCKERTWERKE A.-G. (U.S.P. 1,764,437, 17.6.30. Appl., 8.3.28. Ger., 15.3.27).—See B.P. 287,105; B., 1928, 658.

Apparatus for separating liquids of different sp. gr. W. LINNMANN, JUN. (Re-issue 17,776, 26.8.30, of U.S.P. 1,671,115, 29.5.28).—See B., 1928, 552.

Separation, by distillation, of miscible liquids. T. E. PERKS (U.S.P. 1,774,210, 26.8.30. Appl., 3.11.27. N.Z., 26.4.27).—See B.P. 289,394; B., 1928, 773.

Separating out and removing matter suspended in a fluid. H. S. HELE-SHAW (U.S.P. 1,773,797, 26.8.30. Appl., 13.3.23. U.K., 19.7.22).—See B.P. 210,101; B., 1924, 239.

Separation of gas mixtures. P. SCHUFTAN, Assr. to Ges. F. LINDE'S EISMASCHINEN A.-G. (U.S.P. 1,773,012, 12.8.30. Appl., 9.7.28. Ger., 27.7.27).—See B.P. 294,611; B., 1930, 3.

Preparation of condensed gases. C. W. P. HEY-LANDT (U.S.P. 1,773,140, 19.8.30. Appl., 24.8.28. Ger., 20.9.27).—See B.P. 297,384; B., 1930, 41.

Handling and conveying furnace residues and other solids by water flushing. Ash Co. (LONDON), LTD. (B.P. 333,628, 18.5.29).

[Ductile metal ring for] hydraulic piston packing. H. J. B. Scharnberg (B.P. 333,376, 30.7.29).

Tightening and bearing surfaces of apparatus or machines [containing dust]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 332,939, 26.3.29).

Rotary kilns (B.P. 332,761).—See IX. Lead alloys for packing joints (U.S.P. 1,743,303).—See X. Preventing scums etc. in water (U.S.P. 1,745,141).— See XXIII.

II.-FUEL; GAS; TAR; MINERAL OILS.

Action of chlorine on coal. A. ECCLES and A. MCCULLOCH (J.S.C.I., 1930, 49, 377—386 T).—When chlorine is brought into contact with coal 1 volume of hydrogen chloride is produced for 1 vol. of chlorine taken up by the coal through substitution; a further quantity of chlorine reacts with the coal through addition. The coal, however, absorbs chlorine in excess of that accounted for above, owing to its adsorptive capacity. Hydrogen chloride produced by reaction is also adsorbed by the coal. An apparatus in which the

absorption of chlorine by coal, and the evolution of hydrochloric acid, have been studied under standard experimental conditions is described. Absorption of chlorine by the coal, and the evolution of hydrochloric acid, are rapid in the initial stages of chlorination, but later become very slow until finally equilibrium is attained between the free chlorine in the atmosphere, the hydrogen chloride produced by chlorination, and the chlorinated coal. Temperature, pressure, and fineness of division of the coal influence the amount of hydrogen chloride evolved by the coal under any given set of conditions. An increase in the pressure and temperature, or in the fineness of division of the coal, results in an increased evolution of hydrogen chloride. The initial rate of absorption of chlorine is influenced by all these factors, but the rate of absorption in the later stages is not so strongly affected. If the chlorinated coal is placed under reduced pressure it loses further quantities of hydrogen chloride. At pressures from atmospheric to about 100 mm. of mercury the rate of evolution is comparatively slow, but below the latter pressure evolution is very rapid. Chlorinated coal partly freed from hydrogen chloride by evacuation will reabsorb a large amount of chlorine very rapidly for a short initial period, after which absorption ceases. Re-chlorinated coal, after evacuation, again absorbs chlorine in the same manner as and practically to an equal extent to the chlorinated coal after evacuation. Re-chlorinated coal rapidly loses hydrogen chloride at a reduced pressure approximately equal to that at which hydrogen chloride is evolved freely by the chlorinated coal.

Chemical composition and methods of analysis of peat-forming plants and varieties of peat. S. A. WAKSMAN (Brennstoff-Chem., 1930, 11, 277–281).— Various methods of analysis which have been proposed are briefly criticised and some results obtained by the author's method are discussed (cf. B., 1928, 880). The marked differences in the cellulose and nitrogen contents of high-moor and low-moor peats are attributed to differences in the activity of the micro-organisms (cf. B., 1929, 965). A. B. MANNING.

Determination of moisture in coal. E. E. CASI-MIR and A. POPESCU (Inst. Geol. Roman. Stud. tech. econ., 1929, 13, No. 2; Chem. Zentr., 1930, i, 1563).— Distillation with xylene is preferred; the methods are critically discussed. A. A. ELDRIDGE.

Action of organic solvents on Wattenbach bright pitch coal, with especial reference to the tar yield therefrom. C. STAEMMLER (Brennstoff-Chem., 1930, 11, 281-282).—On refluxing with benzene, aniline, and tetralin, respectively, the coal yielded $8 \cdot 7, 53 \cdot 3$, and $36 \cdot 2\%$ of extract. With aniline it was found difficult to free either the extract or the residue completely from the solvent; with tetralin some decomposition occurred, as was shown by the formation of water and the evolution of hydrogen sulphide. The yield of tar on carbonising the partially extracted coal in the Fischer assay retort was lower (10-16%) than that from the original coal (22.5%). Addition of the solvent to the coal before carbonisation was without influence on the tar yield (cf. Kreulen, B., 1929, 966). With the addition of a machine oil (b.p. $200-400^{\circ}$) to the coal the carbonisation results were irregular, but no increase in the tar yield was observed. The residues from the aniline and tetralin extractions contained 5.03 and 9.72% of humic acids, respectively. Carbonisation of the humic acids yielded only traces of tar (cf. Erdmann, B., 1921, 570 A).

A. B. MANNING.

Cenospheres and the structure of coke. F. S. SINNATT (J.S.C.I., 1930, 49, 335-338 T).-Cenospheres are produced by allowing particles of coal to enter an inert atmosphere maintained at temperatures above about 380°. The bodies are hollow spheres, of which the main features consist of a lattice with the intermediate spaces covered by a film which, by transmitted light, is translucent or transparent. The walls of certain cenospheres contain minute particles which have been termed the tertiary structure. Up to the present the source and nature of the tertiary structure have not been determined. The structures found in cenospheres are shown to be present in coke produced by the carbonisation of coal at low and high temperatures. The results confirm the work of Beilby, who showed that in the formation of coke from a caking coal the product passed through a stage in which it was a foam.

Formation of cenospheres as a means of studying the swelling capacity of coal. J. H. CARLILE and F. S. SINNATT (J.S.C.I., 1930, 49, 355—359 T).—Various methods which have been used to obtain a measure of the swelling capacities of coals are reviewed. A new method is proposed based on the carbonisation of coal in the form of fine particles—cenosphere formation. Figures are given for six coal seams showing the swelling resulting from this method of treatment. Strongly caking coals give a value of 32, which corresponds to an actual swelling of the coal of about 20 times. The method is readily adapted for examination of any coal seams and for studying various effects such as oxidation, weathering, and blending.

Speed and temperature of combustion after preheating gas and air. H. PASSAUER (Gas-u. Wasserfach, 1930, 73, 313-319, 343-348, 369-372, 392-397).-The rate of combustion of hydrogen, carbon monoxide, ethylene, methane, acetylene, and various technical mixture of these gases has been determined and the maximum flame temperature measured with and without preheating of the gases. In all cases maximum flame temperature is obtained when the theoretical amount of air for complete combustion is present. This maximum approaches more closely to the theoretical value the higher is the speed of combustion, the difference between the theoretical and actual values being dependent on the rate of heat exchange per cm.² of combustion surface per sec. This difference is a hyperbolic function of the intensity of combustion in all cases, so it is possible to calculate the actual temperature of the flame from a knowledge of the theoretical maximum temperature and the conditions of combustion. The maximum speed of combustion occurs in mixtures containing a greater deficiency of oxygen as the temperature to which the gases are preheated is increased; the extent of this displacement is greatest at flame temperatures of 1200-1600° and then decreases. The

rate of combustion in g./cm.²/sec. is directly proportional to the increase in the preheating temperature; extrapolation of the curve indicates that this rate approaches zero in the neighbourhood of the absolute zero.

A. R. POWELL.

Composition of benzol from gas manufactured in vertical retorts. W. A. Voss (J.S.C.I., 1930, 49, 343—348 T).—Benzol extracted from gas derived from continuously operated "steamed" vertical retorts carbonising Yorkshire run-of-mine coal is characterised by high contents of unsaturated hydrocarbons and paraffins. As a result of the latter the sp. gr. is low and approximates to 0.845. Though there is no reason to suppose that this low gravity would adversely affect its use as a motor fuel, it makes compliance with the existing benzol specification difficult. The investigation was carried out on two different types of vertical-retort settings and the benzols, which represented the make over a continuous period of some weeks, showed close agreement on analysis.

Recovery of phenol from coke-oven gas liquor in relation to the best known processes of by-product recovery. H. WIEGMANN (Brennstoff-Chem., 1930, 11, 285—288, 304—306; cf. Hoening, B., 1929, 383; Prüss, B., 1929, 1038).—The most efficient arrangement of the phenol recovery plant with various types of by-product recovery process (direct, semidirect and indirect) is discussed and illustrated by reference to he operation of plants in the Ems district. A. B. MANNING.

Removal of coke from Boryslaw asphalt. R. FUSSSTEIG (Petroleum, 1930, 26, 867—868).—During treatment of Boryslaw asphalt for decomposition of the paraffin wax which it contains, considerable quantities of coke are produced. This makes the material unsuitable for road construction, as its softening and wetting properties are modified, and it is necessary to extract the asphaltic substances with benzene in order to separate the coke. R. H. GRIFFITH.

Determination of tar and bitumen in mixtures. J. MARCUSSON and P. LEDERER (Petroleum, 1930, 26, 866-867).-Sulphonation is used to differentiate coal tar, brown coal, and bituminous substances in the presence of each other. The mixture under examination (3 g.) is boiled for 15 min. with chloroform, and the solvent is driven off. The residue is mixed with 6 c.c. of sulphuric acid, heated for 3 hr. on a water-bath, and then poured into 500 c.c. of water. Coal-tar products give substances which are thus rendered completely soluble, but in the case of brown-coal derivatives only partial solubility in warm water is found. If the residue is completely insoluble, only bituminous material was present. Further information can be obtained by repeating sulphonation on the same sample; the products from bituminous substances are insoluble in dilute aqueous ammonia. R. H. GRIFFITH.

Volatility of motor fuels. G. G. BROWN (Dept. Eng. Res., Univ. Michigan, Bull. 14, 1930, 299 pp.).— The ease with which a motor will start, the length of time required to warm it up, and the character of its general performance have been investigated with regard to the volatility of the fuel. It is shown that equi-

librium volatility as determined by the methods of air distillation, computation by Raoult's law, and the dew point is far from reliable and that the ordinary A.S.T.M. method of distillation compares very favourably with the results obtained by continuous equilibrium vaporisation. Tests on a small, water-cooled, 4-cylinder engine appear to show that the ability of a fuel to start a motor at 18° depends very largely on those constituents making up the A.S.T.M. distillation curve below 94°, and, at 2°, on the presence of those constituents making up the curve below 65°. The 10% point is related to the lowest engine temperature at which satisfactory starting may be obtained and the lowest mixture temperature at which the motor may be operated. The 35% point is related to the lowest mixture temperature at which satisfactory performance may be obtained during the warming-up period, and therefore determines the length of time necessary to warm up the motor. The 65% point is related to the lowest mixture temperature at which perfect performance can be obtained. For these reasons the 10%, 35%, and 65% points should be low to ensure satisfactory starting, warming-up, and general performance. The 90% point, however, should not be so low as to indicate a dry mixture, as this means loss of power or acceleration with modern cars equipped with heated manifolds and accelerating devices. The vapour pressure of the fuel or the 10% point should not be so low as to cause trouble through vapour-lock. The relations developed make it possible to determine the volatility characteristic of a fuel for any desired engine performance. H. S. GARLICK.

Removal of sulphur from petroleum products. M. NAPHTALI (Brennstoff-Chem., 1930, 11, 282–285).— Recent developments in the methods of refining petroleum products are summarised. A. B. MANNING.

Polymerisation reactions of ethylene. H. M. STANLEY (J.S.C.I., 1930, 49, 349-354 T) .- A summary of previous work on the polymerisation of ethylene by ultra-violet light, silent electric discharge, heat, pressure, and catalysts such as anhydrous metallic halides is given. The polymerising action of aluminium chloride is considered to be a reaction of the Friedel-Crafts type and numerous examples of the Friedel-Crafts reactions in the olefine series are adduced. The author's own experiments on the polymerising action of various catalysts on ethylene at pressures up to 60 atm. in a steel autoclave are briefly summarised. In the absence of catalyst, condensation of ethylene to liquid hydrocarbons took place under pressure at 325° and the reaction was rapid at 350°. The reaction between aluminium chloride and ethylene under pressure at room temperature resulted in the formation of a free oil and a pasty double compound of aluminium chloride and liquid hydrocarbons. The free oil consisted of liquid hydrocarbons of the formula $C_n H_{2n}$ with about 10-45 carbon atoms per mol. and mostly of a saturated nature, presumably cycloparaffins. The "combined" oil, liberated from the aluminium chloride complex by iced water, also consisted of a mixture of liquid hydrocarbons containing from 10 to over 50 carbon atoms per mol. The latter appeared to be unsaturated and contained rather less hydrogen than C_nH_{2n} . At higher temperatures (up

to 180°) the condensation between ethylene and aluminium chloride was much more rapid and resulted, as before, in the production of a free oil and an aluminium chloride complex compound. This complex tended to become more and more carbonaceous at higher temperatures. The free oil produced at higher temperatures contained large proportions of low-boiling paraffin hydrocarbons, whilst the higher-boiling fractions were deficient in hydrogen and corresponded to the formulæ C_nH_{2n-6} , C_nH_{2n-8} , and C_nH_{2n-10} . Lower paraffin hydrocarbons also appeared in the residual gases from the experiments, their amount increasing with rise in temperature. A theory of the mechanism of these reactions is outlined.

Fatty acids from oxidation of mineral oils. Collin.—See III. Determination of traces of carbon monoxide. ANON.—See VII. "Penetrol" as insecticide. HOERNER.—See XVI.

See also A., Aug., 994, Water-gas equilibrium and the electric discharge (PETERS and KÜSTER). 1002, Oxidation processes in motor fuels (BERL and WINNACKER).

PATENTS.

Apparatus for the dry distillation and method for the preliminary drying of bituminous materials. EESTI PATENDI AKTSIASELTS (B.P. 307,795, 8.3.29. Esthonia, 13.3.28).—A tunnel oven suitable for carrying out the distillation process described in B.P. 278,740 (B., 1929, 44) comprises a drying and preheating chamber, a distillation chamber, and a cooling chamber, through which the material is conveyed in layers of over 50 cm. thickness on cars having gaspermeable bottoms. Lock chambers are provided at both ends of the distillation chamber to prevent access of air thereto. Distillation is effected by the repeated circulation of hot gaseous and vaporous products of distillation, to which additional steam may be added if desired, through suitably arranged superheaters and through the material. The circulation is produced by means of fans in the distillation chamber, each car therein having its corresponding fan and superheater, which are so arranged that a different régime may be maintained in different parts of the distillation chamber. The superheaters are heated by the gases from a combustion chamber, and the exhaust gases from the superheaters are utilised in drying and preheating the material. A. B. MANNING.

Combustion apparatus and method. A. J. WHEELER (B.P. 331,183, 19.2.29).—The combustion of a stream of pulverised coal, oil, or gas in a furnace is accelerated by applying heat to the stream at a point near its entry into the furnace by means of a supplementary flame. Provision may be made for supplying air for combustion at successive points in the length of the main flame. A. B. MANNING.

Preparation of pulverised fuel for combustion. PEABODY ENG. CORP., Assees. of H. T. DYER (B.P. 309,572, 9.3.29. U.S., 14.4.28).—The finely-divided fuel suspended in carrier air is conveyed to a distributor into which a current of compressed air is injected in such a manner as to effect uniform distribution of the fuel in the air. The stream is then split up into a

number of separate streams for delivery to the individual points of consumption. A. B. MANNING.

Preheating of carbonaceous materials prior to their destructive hydrogenation. W. R. TATE, H. P. STEPHENSON, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 330,498, 8. and 31.12.28). The material is preheated in stages at successively higher pressures. The first stages are carried out in the absence of hydrogen, but under pressure if desired, and without substantial decomposition of the material, and the succeeding stages are carried out in the presence of hydrogen.

A. B. MANNING.

Distillation of coal or other carbonaceous material. F. PUENING (B.P. 312,238, 22.5.29. U.S., 22.5.28). -A series of concentric circular walls are suspended from a water-cooled framework in such a manner as to form between them a series of annular coking chambers. The walls are hollow and are heated by the circulation therein of hot gases supplied from superimposed, annular, hot gas chambers connected with a furnace. The charging and discharging mechanism operates from the underside of the chambers, and consists of a rotating platform on the front of which is a number of rakes, each passing into one of the chambers to remove the coke, and at the rear of which is a coal charger for supplying each individual chamber from a central bunker. The base of the chambers is formed by dropdoors, the operation of which is dependent on the rotating platform. An annular chamber below the system of coking chambers permits the movement of the dropdoors and accommodates the coke-removing mechanism.

A. B. MANNING.

Distillation of solids carrying carbonaceous materials. H. O. SCHUNDLER (B.P. 330,531, 8.3.29).-Oil shale, coal, etc. is distilled in a rotary, horizontal retort, preferably of hexagonal cross-section and in the shape of a frustum of a pyramid, which is slowly rotated and is devoid of internal projections likely to cause gas disturbance, so that the vapours evolved at different points as the material passes down the retort and is heated to successively higher temperatures form stratified layers and pass through the outlet in such formation. A current of nitrogen may be introduced into the retort at the charging end at a rate which does not disturb the stratification. A. B. MANNING.

Low-temperature distillation or carbonisation of bituminous coal. A. V. ABBOTT (B.P. 330,902, 18.3.29).-A horizontal rotary retort is constructed with outer and inner walls forming an annular distillation chamber, the outer wall being provided with lifting ribs or baffles, and the inner wall with retarding baffles. The coal is thereby given an alternately advancing and retarding movement as it passes through the chamber. The temperatures of the walls are so adjusted that the coal is subjected to different distillation temperatures while advancing and retarding, respectively. The temperatures are controlled by the provision of vessels filled with molten lead which are interposed between the combustion chamber and the. walls of the retort. A. B. MANNING.

Low-temperature carbonisation of coal and other suitable fuels. J. E. HACKFORD (B.P. 331,193,

21.12.28).-The fuel is charged into cylindrical containers which are then carried through a horizontal retort on an endless-chain conveyor. The containers enter and leave at both ends of the retort, one set being carried through in one direction on the upper part of the conveyor, and another set in the opposite direction on the lower part. Automatic means are provided outside the retort for lining the containers with a . suitable medium (cf. B.P. 326,813; B., 1930, 545), charging them with coal, and discharging the coke therefrom. The retort, the walls of which are built up of hollow cast-iron sections, comprises a central carbonising zone, and two end zones wherein the coal is preheated or the coke produced is cooled. The central zone is heated by means of tubes which traverse the retort from side to side, and are fired at one end by gas or oil burners. After traversing the heating tubes the hot gases are circulated within the hollow walls of the retort. A. B. MANNING.

Carbonisation of coal, peat, wood, etc. C. B. WINZER (B.P. 330,980, 22.3.29).—A series of stationary retorts are mounted within a circular-travelling, closed tunnel of inverted U-shape in cross-section. Part of the tunnel is provided with double walls and is heated by the circulation of hot gases in the intervening space, thereby bringing about the carbonisation of the material in the retorts as the heated section of the tunnel passes over them. After circulating between the double walls of the tunnel, the hot gases may be passed round the retorts within the tunnel and thence to a chimney. Provision is made for charging and discharging the retorts while they are in the cooler part of the tunnel, and for isolating these retorts from the others by gastight doors during this operation. Each retort is provided with offtake pipes for leading off the volatile products of distillation. A. B. MANNING.

Production of free carbon from hydrocarbons. G. C. LEWIS (B.P. 309,488, 14.3.29. U.S., 11.4.28).-Natural gas, stripped of its heavier constituents, is passed through a tube heated at a temperature (600-900°) at which cyclic hydrocarbons are produced, but below that at which any free carbon is formed, the condensable products are removed, and the residual gas, containing 15-70% H2, is subjected to incomplete combustion for the production of free carbon. The heat evolved in the last stage of the process is used to preheat the gas. (Cf. B.P. 309,992, following.)

A. B. MANNING.

Production of carbon [black]. G. C. LEWIS (B.P. 309,992, 14.3.29. U.S., 19.4.28. Cf. B.P. 309,488, preceding).-The process depends on the incomplete combustion of mixtures of gaseous hydrocarbons with hydrogen, containing 15-70% of the latter. The proportion of hydrogen used varies with the hydrocarbons and with the desired yield and quality of the carbon produced. The hydrogen may be added to the hydrocarbons or may be produced from the latter by a suitable cracking process. Any aromatic hydrocarbons formed in the cracking process may be separated from the gas before it is supplied to the burners.

A. B. MANNING.

Reactivation of decolorising carbon. F. W.

MEYER (B.P. 317,017, 8.8.29. Ger., 8.9.28).—The spent carbon, preferably in a moist condition, is subjected to the action of steam at temperatures between 180° and 300°, in a closed vessel. A. B. MANNING.

Method of generating gas. C. W. ANDREWS and W. B. CHAPMAN (B.P. 330,509, 9.2.29).—An ash-liquefying zone is maintained at an intermediate level in the fuel bed of a gas producer, and the liquefied ash runs down into a slightly cooler zone wherein it is subjected to the action of a water-cooled agitating member which breaks up the clinkers and prevents the formation of large masses. The steam is passed both up and down through the fuel bed, the ratio of downward steam to total steam being at least 60%. A relatively shallow fuel bed is maintained so that the blast gases contain not more than 14% CO. The ash is removed continuously from the bottom of the fuel bed. A. B. MANNING.

Gas producers. J. U. MARGUET (B.P. 330,815, 30.7.29).—A gas producer with reversed draft is provided with an annular metallic evaporator embedded in the refractory wall of the shaft. The air for combustion passes through the evaporator, the mixture of air and steam thereby formed passing into the shaft through a circular slot. A. B. MANNING.

Manufacture of gas. HUMPHREYS & GLASGOW, LTD., Assees. of H. G. TERZIAN (B.P. 319,769, 10.9.29. U.S., 29.9.28).—A mixed oil gas and blue water-gas is produced by cracking oil gas with deposition of carbon in an incandescent fuel bed, and generating blue water-gas by air- and steam-blasting the fuel bed, the deposited carbon being partly burned to heat the fuel bed and partly converted into water-gas by interaction with steam. The oil gas is preferably passed through the fuel bed alternately in one direction and then in the other between air-blasting periods, and may be derived from an outside source or may be generated in the carburettor or superheater. A. B. MANNING.

Producing a mixture of oil gas and water-gas. HUMPHREYS & GLASGOW, LTD., Assees. of H. G. TERZIAN (B.P. 331,138, 11.9.29. U.S., 8.11.28).—Blue watergas is produced by air- and steam-blas ing an ignited fuel bed, and oil is then introduced into the system in such a manner that the oil gas or oil vapour passes through the carburettor and the fuel bed in parallel, thereby producing lightly cracked and heavily cracked oil gas. A. B. MANNING.

Production of gaseous mixtures suitable for the synthesis of hydrocarbons, methyl alcohol, and other oxy-organic compounds. G. NATTA (B.P. 330,918, 11.3.29).—A mixture of carbon monoxide, carbon dioxide, and hydrogen, containing at least 2 vols. of hydrogen for each vol. of carbon monoxide, is produced by passing a mixture of oxygen and steam over carbon, substantially free from volatile impurities, at not above 750°. The reaction temperature is regulated either by varying the preheating of the gaseous mixture, or by introducing suitable quantities of water into the reaction zone in place of the corresponding quantities of steam. The reaction may, with advantage, be carried out under pressure. A. B. MANNING.

Preparing [explosive] gases [e.g., acetylene] by

interaction of solids and liquids. Production of acetylene from carbide and water. AUTOGENWERK SIRIUS GES.M.B.H. (B.P. 330,821—2, 8.8.29. Ger., [A] 22.2.29, [B] 15.5.29).—Forms of acetylene generators are described. A. B. MANNING.

Treatment of natural gas. G. C. LEWIS (B.P. 316,999, 14.3.29. U.S., 8.8.28).—A portion (90%) of the gas is passed through tubes heated by the combustion of the remainder, and the gases produced by the heat treatment of the former are mixed with the hot products of combustion of the latter; the mixed gases are expanded and cooled, and are then passed through an absorber for the removal of benzene. The residual gas, if desired, may be burned for the production of carbon black, the waste heat from this process being utilised in preheating the original gas.

A. B. MANNING.

Removal of sulphur impurities from combustible gases. W. J. HUFF, L. LOGAN, and O. W. LUSBY (B.P. 330,933, 19.1.29).—The gas is passed over a purifying mass consisting of a mixture of metals or metallic oxides, including at least one from group V, *e.g.*, mixtures of copper with chromium, uranium, or vanadium, at raised temperatures, *e.g.*, 250°. The mass is revivified by treatment with an oxygen-containing gas at 250° or above, the apparatus being purged with a non-combustible gas before and after passing the revivifying gas. The purifying mass may be formed into granules resistant to disintegration, by fusing, or by admixture with clay etc., or may be deposited on a suitable carrier. A. B. MANNING.

Distillation of tar. BARRETT Co., Assees. of S. P. MILLER (B.P. 308,577, 9.2.29. U.S., 23.3.28. Cf. B.P. 286,278; B., 1929, 970).—Tar, pitch, or tar oils are distilled in an externally heated still into which the hot coal-carbonisation gases from coke ovens, horizontal retorts, etc. are introduced in such a manner as to be brought into intimate contact with the material being distilled. If desired, the hot gases may be cleaned, *e.g.*, by scrubbing with pitch or by electrical precipitation, before entering the still. A. B. MANNING.

Manufacture of coal-tar products [e.g., electric insulating material, artificial ebonite, etc.]. A. GERLEY and W. A. MACKINLAY (B.P. 330,712, 3.5.29).— A mixture of the middle oils from the distillation of coal tar with copper sulphate, methyl alcohol, an aqueous solution of glue, rosin, and hydrochloric acid or an alkali is submitted to suitable heat and pressure. Finely-ground inert materials, e.g., wood-pulp, wornout tyres, etc. may be incorporated as fillers and aniline dyes added. A. B. MANNING.

Cracking of hydrocarbons. G. F. FORWOOD, J. G. TAPLAY, and UNITED KINGDOM OIL CO., LTD. (B.P. 332,285, 18.4.29).—Kerosene or crude oil residue is atomised with superheated steam into an inclined cylindrical vessel containing a catalyst obtained by treating cellulose charcoal with 5% of China clay dispersed in sodium silicate. The catalyst is maintained at 400—650°, and additions are made as the catalytic material is consumed. Vapours from the catalysing chamber are conducted to a large dephlegmating column, where they are cooled and heavy fractions separated.

From 1 to 1.5 lb. of steam is used per 1 lb. of oil, the steam being largely decomposed. T. A. SMITH.

Production of light hydrocarbons by destructive hydrogenation of carbonaceous materials. J. L. FOHLEN (B.P. 313,963, 18.6.29. Appl., 20.6.28).—Carbonaceous material, e.g., shale oil, is heated in an autoclave with a metallic halide, iron filings, and copper or brass shavings. The temperature is maintained at $300-400^{\circ}$ for 4 hrs. and the pressure rises to 120-180atm. After treatment the shale oil yields 50% of a light oil ($d \ 0.850$) boiling below 200° and 42% of an oil ($d \ 0.870$) boiling at $200-300^{\circ}$. [Stat. ref.]

T. A. SMITH.

Working-up of distillable carbonaceous liquids containing substances of high mol. wt. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 332,336, 15.5.29).—In the hydrogenation of carbonaceous liquids containing substances (e.g., asphalt or pitch) of high mol. wt., the latter, which causes trouble owing to the poisoning and clogging effect they have on the catalyst, may be removed by absorbing them on a prepared absorbent, such as silica, calcined after impregnation with molybdenum and zinc nitrates. The oil is freed from the asphalt and absorbent by means of a centrifuge, and each portion is hydrogenated separately under suitable conditions of temperature and pres ure. The absorbent may then be regenerated. T. A. SMITH.

Working-up of the oil-bearing residues from destructive hydrogenation or pressure-extraction processes. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 330,723, 10.5.29. Addn. to B.P. 304,404; B., 1929, 232).—The residues are mixed with solid carbonaceous materials, *e.g.*, poorly coking coals, and are carbonised at temperatures above 600°. Recovery of 90—95% of the oil in the residues is possible and a highly reactive coke is obtained, particularly suitable for the production of water-gas. A. B. MANNING.

Illuminating oil and its manufacture. F. W. HALL, Assr. to TEXAS Co. (U.S.P. 1,752,229, 1.4.30. Appl., 9.1.26).—An oil fraction of viscosity 100—150 sec. (Saybolt) at 100°, water-white in colour, and of approx. zero iodine value is prepared by acid-treating a suitable fraction followed by upward filtration through fuller's earth. From 5 to 40% of this oil is mixed with refined heavy kerosene to give a suitable railway-signal lamp oil. T. A. SMITH.

Conversion of heavy hydrocarbon oils into light hydrocarbon oils or spirits. F. LAMPLOUGH (U.S.P. 1,765,167, 17.6.30. Appl., 27.5.26. U.K., 23.6.25).— See B.P. 258,656; B., 1926, 972.

Purification of hydrocarbon oils. J. TAUSZ (U.S.P. 1,772,921, 12.8.30. Appl., 8.7.24. Ger., 16.7.23). —See G.P. 447,557; B., 1928, 807.

Apparatus for use in discharge of coke ovens. Wellman Smith Owen Eng. Corp., Ltd., and S. Stockdale (B.P. 333,294, 11.5.29).

[Poking device for] gas producers. A. JADOUL (B.P. 315,327, 11.7.29. Belg., 11.7.28).

[Electrically controlled] apparatus for automatic manufacture of [carburetted] water-gas. HUMPHREYS & GLASGOW, LTD., Assees. of M. PARSONS (B.P. 311,279, 6.5.29. U.S., 8.5.28).

Coal-dust burners. S. Löffler (B.P. 312,059, 3.5.29. Ger., 19.5.28).

Apparatus for burning pulverised fuel. G. H. ROBINSON (B.P. 333,017, 29.6.29).

Gas burners. W. E. N. CLARK, and ELECTROLUX, LTD. (B.P. 333,269, 9.4.29).

Gas and/or oil heating appliances. Gas Light & Coke Co., J. C. Clark, and C. A. MASTERMAN (B.P. 333,338, 11.6.29).

Steam for water-gas plants (B.P. 333,472).—See I. Reduction of carbon monoxide (U.S.P. 1,741,306— 8). Higher alcohols (U.S.P. 1,738,785). Polymerisation of diolefines (B.P. 331,265). Catalytic oxidation of toluene etc. (B.P. 331,525 and 331,535). Purification of aromatic hydrocarbons (U.S.P. 1,741,305). Conversion of phenols etc. into hydrocarbons (B.P. 331,199).—See III. Filtering material (U.S.P. 1,734,197).—See VII. Pavement materials (B.P. 333,433).—See IX. Tanning agents (B.P. 332,204).— See XV.

III.-ORGANIC INTERMEDIATES.

Fatty acids from oxidation of mineral oils. G. COLLIN (J.S.C.I., 1930, 49, 333-334 T).-An attempt has been made to apply the ester fractionation method to the analysis of a sample of fatty acids stated to have been made commercially by the oxidation of paraffin wax; the fatty acids in question consisted of a creamcoloured solid material with a faint characteristic odour, equivalent (saponification) 268.4, (by direct titration) 348.7, iodine value 7.5, non-acidic material about 17%. Fractionation of the esters of the fatty acid mixture indicated that the 80% or more of acidic material present had mol. wt. ranging from about 145 to about 300; the acids were almost entirely saturated, there was no sign of the presence of outstanding amounts of any one acid, the mixture of acids present was much more complex than in the case of those of a natural fat, and attempts to isolate individual acids by crystallisation of redistilled ester fractions did not lead to the identification of any known fatty acids. From the observed equivalents it seems probable that acids containing an odd number of carbon atoms in the molecule are present in the mixture, and the m.p. obtained after several recrystallisations suggest that mixtures of acids were still present or that certain of the products, if individual, consisted of branched-chain acids.

Phenol from gas liquor. WIEGMAN.—See II. Hydrogenation of unsaturated fatty acids. SUZUKI and INOUYE.—See XII. p-Dichlorobenzene as insecticide. SNAPP.—See XVI. Ethylene oxide as fumigant. BACK and others.—See XIX.

See also A., Aug., 1027, Preparation of diazomethane (ARNDT and AMENDE). 1039, Isomeric *p*-benzoquinonedithioglycollic acids (GEBAUER-FÜLNEGG and JARSCH). 1042, Benzanthrone series (MAYER and others). 2:7-Dimethylanthraquinone (MAYER and GÜNTHER). 1043, Halogenoquinizarins (WALDMANN). Phenanthraquinone, 1:4-naphtha

quinone, and 1:4-anthraquinone (Skitta and Rohr-MANN).

tod , one PATENTS, one of the lend

Reducing the products of carbon monoxide. A. O. JAEGER, Assr. to SELDEN Co. (U.S.P. 1,741,306-8, 31.12.29. Appl., [A-c] 8., 9., and 10.11.27).-The activity of mild reduction catalysts, such as copper, manganese, cadmium, zinc, lead, tin, magnesium, silver, gold, and platinum, or their compounds, is moderated further by the addition of oxidation catalysts, such as compounds of chromium, vanadium, manganese, titanium, molybdenum, tungsten, cerium, thorium, uranium, zirconium, etc. (A) The reduction to the methyl alcohol stage takes place in presence of the mixed catalysts on porous carriers, and the further stage to methane in presence of strong reduction catalysts, such as iron, nickel, cobalt, or palladium. (B) In the first stage the mild reduction catalyst is supported on the oxidation catalyst as carrier, or (c) the two catalysts are mixed together. C. HOLLINS.

Synthesis of methyl alcohol and catalyst therefor. H. H. STORCH, ASST. to ROESSLER & HASSLACHER CHEM. Co. (U.S.P. 1,738,971, 10.12.29. Appl., 2.8.27).— Carbon monoxide and hydrogen are passed under pressure at 300—400° over a copper-magnesia-silica catalyst formed by reducing the precipitate obtained by adding sodium hydroxide to a solution of sodium silicate, magnesium nitrate, and copper nitrate.

C. HOLLINS.

Manufacture of higher alcohols. R. H. McKEE and S. P. BURKE, Assrs. to R. L. BROWN and W. W. ODELL (U.S.P. 1,738,785, 10.12.29. Appl., 21.2.23).— Unsaturated hydrocarbons, *e.g.*, cracked gases, are passed with steam at 350—450° over alumina or other hydrating catalyst. C. HOLLINS.

Polymerisation [of diolefines] and apparatus therefor. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 331,265, 23.3.29).—A second chamber, containing no polymerising agent, is connected with the reaction vessel so that on the occurrence of undesirable violent reactions the starting material distils into the second chamber, whence it may be returned when convenient, e.g., by distillation or by gravity, to the reaction vessel. C. HOLLINS.

Preparation of diolefines directly from alcohols. S. V. LEBEDEV (B.P. 331,482, 30.1.29).—Vapours of methyl, ethyl, or propyl alcohols, or mixtures of these, are led at 400°, preferably at reduced pressure (e.g., 0.25 atm.), over a mixture of a dehydrating and a dehydrogenating catalyst, e.g., alumina and zinc oxide. C. HOLLINS.

Manufacture of acetic anhydride and acetaldehyde. Soc. DES USINES CHIM. RHÔNE-POULENC (B.P. 318,960, 2.7.29. Fr., 13.9.28).—The vapours from the dissociation of ethylidene diacetate are led through a suspension or solution of organic salts (e.g., potassium acetate) in a mixture of ethylidene diacetate and acetic anhydride so as to remove hydrochloric acid or other polymerising agent. C. HOLLINS.

Manufacture of aldehydes from α -oxides of hydrocarbons [olefine oxides]. J. Y. JOHNSON.

From I. G. FARBENIND. A.-G. (B.P. 331,185, 18.3. and 14.10.29).—An olefine oxide is passed at 180—300° over a catalyst comprising an element of group V or VI in the form of a non-volatile oxygenated acid, acid anhydride, or salt, *e.g.*, magnesium pyrophosphate, copper sulphate, cerous sulphate, with or without addition of metal oxides, hydroxides, or carbonates, on a carrier (pumice, kieselguhr) if desired. Propylene $\alpha\beta$ -oxide gives propaldehyde, with allyl alcohol and acetone; butylene $\alpha\beta$ - or $\beta\gamma$ -oxide yields *n*- and *iso*-butaldehydes, with methyl ethyl ketone and butenols; ethylene oxide gives acetaldehyde.

C. HOLLINS.

Manufacture of aldehydes from alcohols. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 331,883, 11.4.29).—An alcohol vapour is passed at 200—380° and at pressure not exceeding atmospheric over an alkali-free catalyst comprising copper, which has been reduced below red heat, and a metal oxide or phosphate, *e.g.*, zinc oxide, magnesia, or disodium hydrogen phosphate; such a catalyst retains its activity longer than in the absence of a promoter. C. HOLLINS.

Concentration or extraction of organic acids occurring in aqueous solution. Soc. ANON. DES DISTILLERIES DES DEUX-SÈVRES (B.P. 331,637, 10.5.29. Fr., 20.3.29. Addn. to B.P. 312,046; B., 1930, 232).— The process of the prior patent is extended to aliphatic acids other than acetic; *e.g.*, for propionic acid the solvent is butyl propionate and the entraining liquid a petroleum fraction, b.p. 138—140°; for formic acid, amyl formate and heptane are used. C. HOLLINS.

Ether-alcohol esters of fatty acids. J. M. KESSLER and O. B. HELFRICH (U.S.P. 1,739,315, 10.12.29. Appl., 25.4.28).—A glycol monoalkyl ether is esterified with an aliphatic acid above C_5 (stearic acid) to give plasticisers. The stearate, m.p. 55—60°, of diethylene glycol monoethyl ether (β -hydroxy- β '-ethoxydiethyl ether) is described. C. HOLLINS.

Production of amines from organic acids and their anhydrides. KNOLL A.-G. CHEM. FABR., and K. F. SCHMIDT (B.P. 307,798, 11.3.29. Ger., 13.3.28).— Carboxylic acids or anhydrides in sulphuric acid react with azoimide in chloroform at 40° to yield primary amines: $R \cdot CO_2H + N_3H \rightarrow R \cdot CO \cdot N_3 + H_2O \rightarrow R \cdot NH_2$ $+ N_2 + CO_2$, or $N_3H \rightarrow NH: + N_2$; $R \cdot CO_2H + NH$ $\rightarrow R \cdot NH_2 + CO_2$. The preparation of aniline from benzoic acid, benzylamine from phenylacetic acid, tetramethylenediamine from adipic acid, pentamethylenediamine from *d*-leucine, and methylamine from acetic anhydride is described. The yields are 70-92% of theoretical. C. HOLLINS.

Production of imino-ethers. K. F. SCHMIDT and P. ZUTAVERN (B.P. 331,947, 19.4.29).—Ketones react with azoimide in benzene in presence of sulphuric acid, hydrogen chloride, thionyl chloride, zinc chloride, phosphoryl chloride, phosphorus pentoxide, etc. in an alcohol, with production of imino-ethers: $R \cdot CO \cdot R' +$ $N_3H \rightarrow RR'C(OH) \cdot N < + N_2$; $RR'C(OH) \cdot N < +$ $R'OH \rightarrow R \cdot C(OR'')$:NR', a Beckmann transformation taking place. cycloPentanone, azoimide, and ethyl alcohol yield the cyclic imino-ether, 2-ethoxy-3:4:5:6-tetrahydropyridine, b.p. 161—165°. The preparation of N-methylacetiminoethyl ether, b.p. 99—100°, and a cyclic imino-ether, b.p. 214—216°, from cyclohexanone, azoimide, and butyl alcohol is also described. C. HOLLINS.

Manufacture of glyoxal and glycollic acid. E. E. Avres, JUN., Assr. to B.A.S. Co. (U.S.P. 1,741,394, 31.12.29, Appl., 28.11.27).—A relatively slow stream of oxygen is introduced into a tube carrying acetylene at high velocity. The exit gases, after condensation of the glyoxal formed, are recirculated. The glyoxal is converted into glycollic acid, if desired, by caustic alkali in a scrubbing tower which replaces the condenser. C. HOLLINS.

Preparation of thymol. RHEINISCHE KAMPFER-FABR. G.M.B.H. (B.P. 309,031, 28.3.29. Ger., 3.4.28. Addn. to B.P. 326,215; B., 1930, 532).—In place of the propylated and *iso*propylated *m*-cresols of the prior patent there are used derivatives of these made by sulphonation or treatment with phosphorus pentoxide etc. Conversion into thymol occurs at lower temperatures. C. HOLLINS.

Production of the potassium salts of the acid sulphuric esters of α - and β -diacetonefructoses. H. OHLE (B.P. 331,922, 12.4.29).—Diacetonefructose potassium sulphates are obtained by adding diacetonefructose to a cooled mixture of pyridine and chlorosulphonic acid, and after some hours distilling off the pyridine and neutralising with potassium hydroxide.

C. HOLLINS.

Manufacture of β -naphthylaminoaryloxy-fatty acids. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 331,597, 10.4.29).-The Bucherer reaction is applied to the condensation of \beta-naphthols or -naphthylamines with m- or p-aminophenoxy-derivatives of aliphatic acids. Sodium p-aminophenoxyacetate, e.g., is boiled with sodium bisulphite and sodium 2:3hydroxynaphthoate to give 4- β -naphthylaminophen-oxyacetic acid, m.p. 156°, which yields with diazotised p-nitroaniline-o-sulphonic acid a bluish-violet dye. The following N-substituted p-aminophenoxyacetic acids are also described ; 6-carboxy- and 7-sulpho-βnaphthyl-, 8-hydroxy-6-sulpho-B-naphthyl, 5-aminoand 5-hydroxy-7-sulpho-\beta-naphthyl-, and 6-amino-8sulpho-β-naphthyl-. o-Chloro-p-aminophenoxy-, 5amino-o-tolyloxy-, and m-aminophenoxy-acetic acids behave similarly. C. HOLLINS.

Manufacture of γ -alkyl- and γ -aryl-quinolines and their homologues. I. G. FARBENIND. A.-G. (B.P. 308,365, 22.3.29. Ger., 22.3.28).—A primary arylamine is condensed with a β -hydroxyketone or the corresponding unsaturated ketone in presence of sulphuric acid (or other dehydrating agent) and an oxidant, and the resulting 4-alkyl- or -aryl-quinoline is separated by steam-distillation or preferably by precipitation with ferrocyanic acid. The preparation of lepidine from aniline and methyl β -hydroxyethyl ketone or vinyl methyl ketone, of 4:6-dimethylquinoline from *p*toluidine and methyl β -hydroxyethyl ketone, and of 3:4-dimethylquinoline from aniline and methyl β hydroxyisopropyl ketone is described. The yields are 10—34% of theoretical. C. HOLLINS.

Catalytic oxidation of (A) toluene, (B) organic compounds, particularly toluene and like hydrocarbons [anthracene, naphthalene, benzene]. Gas LIGHT & COKE Co., W. G. ADAM, W. V. SHANNAN, and M. CUCKNEY (B.P. 331,52 5and 331,535, 29.1.29).-(A) In the air-oxidation of toluene to benzaldehyde and benzoic acid the exit gases are mixed with air and, after being successively saturated with toluene vapour and water vapour, are led at high velocity over a suitable catalyst, closely packed, where only a portion of the toluene is oxidised, and thence to a condenser. The toluene solution of benzaldehyde etc. is circulated to the toluene saturator and the exit gases return to the circuit. (B) A suitable catalyst for air-oxidation of toluene etc. is made by precipitating iron vanadate and iron oxide on short asbestos fibre, extruding the paste into rod form, and drying at 100°. The iron oxide should form 50-60% of the mixed vanadate C. HOLLINS. and oxide.

Purification of aromatic hydrocarbons. A. O. JAEGER, ASST. to SELDEN CO. (U.S.P. 1,741,305, 31.12.29. Appl., 4.2.26).—Crude light benzene, before or after removal of acids and bases, is treated with a limited amount of chlorine to convert aliphatic compounds, thiophens, carbon disulphide, etc. into high-boiling products, from which the pure aromatic hydrocarbons are separated by distillation. C. HOLLINS.

Manufacture of intermediates for dyes. IMPERIAL CHEM. INDUSTRIES, LTD., and M. WYLER (B.P. 331,687, 27.6.29).—Acetyl-m-2-xylidine is nitrated at 5—20° with mixed acid, the nitro-compound is reduced, and the resulting amine is converted by diazotisation etc. into 2-acetamido-m-4-xylenol, m.p. 191°. Hydrolysis with 50% sulphuric acid yields 2-amino-m-4-xylenol, m.p. 170°. C. HOLLINS.

Conversion of oxygen-containing organic substances, such as phenols, into substances free from oxygen. H. D. ELKINGTON. From N.V. DE BATAAFSCHE PETROLEUM MAATS. (B.P. 331,199, 8.2.29).—Hydrocarbons are obtained by passing vapours of phenols etc. (e.g., tars) with hydrogen etc. under pressure over a molybdenum-carbon catalyst, preferably colloidal molybdenum oxide on finely-divided charcoal or brown coal, heated gradually (40—50 min.) to 450°.

C. HOLLINS.

Manufacture of [nuclear] alkylated phenols. SCHERING-KAHLBAUM A.-G. (B.P. 308,662, 25,3.29. Ger., 23.3.28).—A phenol is heated at $140-200^{\circ}$ with an olefine under pressure in presence of a surface catalyst (tonsil), and heating is continued until the first-formed phenol ether is converted into *C*-alkylated phenol. The preparation of *p*-propylphenol, *p*-cyclohexylphenol, and 4-cyclohexyl-*m*-cresol is described. Alcohols generating olefines under the reaction conditions may be used. The reaction of cresols with propylene is excluded. C. HOLLINS.

Manufacture of aminophenol derivatives. H. T. CLARKE, ASST. to EASTMAN KODAK CO. (U.S.P. 1,745,843, 4.2.30. Appl., 3.4.24).—o-Aminophenol is converted by means of acetic acid at 175—190° into 2-methylbenzoxazole, which is then treated with methyl sulphate at 80—100°. The resulting additive compound is treated with cold alkali to give acetylmethylaminophenol which is hydrolysed with dilute sulphuric acid to give methyl-o-aminophenol sulphate.

C. HOLLINS. Manufacture of water-soluble preparations of phenolic condensation products useful for tanning and other purposes. I. G. FARBENIND. A.-G. (B.P. 302,666 and Addn. B.P. 302,938, [A] 19.12.28. Ger., 19.12.27. [B] 22.12.28. Ger., 23.12.27).-(A) Phenolic condensation products having tanning properties are dispersed with the aid of sulphonated aromatic or hydroaromatic hydrocarbons in high concentration; or the condensation is performed entirely or in its later stages in presence of these sulphonic acids, or in the sulphonation mix. E.g., the resin from phenol and chloroacetone, introduced into tetrahydronaphthalene and 98% sulphuric acid, gives a product which dissolves in water to an acid solution remaining clear on addition of alkali. (B) In addition to the phenolic condensation product an inert or slowly reacting high-molecular, nonphenolic substance is introduced, e.g., resins, oils, waxes, fats (colophony, coumarone resin, castor oil, crude tar fraction of b.p. 200-300°). C. HOLLINS.

Manufacture of β -sulphophthalic acid. H. MILDNER, ASST. to GEN. ANILINE WORKS, INC. (U.S.P. 1,745,025, 28.1.30. Appl., 4.9.28. Ger., 14.6.27).— Phthalic anhydride is sulphonated in the 4-position by oleum at 110—150° in presence of mercuric sulphate. C. HOLLINS.

Metal salts of phthalic esters. [Driers for paints etc.] C. I. B. HENNING, C. E. BURKE, and E. E. REID, Assrs. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,742,506, 7.1.30. Appl., 24.9.24).—The heavy-metal salts of monoalkyl phthalates are soluble in acetone and are useful as drying agents in paints and varnishes. The ferrous, ferric, zinc, mercurous, mercuric, lead, stannous, manganous, nickel, cobalt, and copper salts of *n*-butyl hydrogen phthalate are described.

C. HOLLINS.

Manufacture of aromatic amino-sulphochlorides [arylaminesulphonyl chlorides]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 331,596, 10.4.29).-Primary arylaminesulphonic acids are heated at 80-90° with chlorosulphonic acid, whereby sulphonic groups are converted into sulphonyl chloride groups; new sulphonyl groups or chlorine may also be introduced. The following compounds are described : 4-chloroaniline-3sulphonyl chloride, m.p. 80-90°; 2:5-dichloroaniline-4-sulphonyl chloride, m.p. 137-138°; 4 : 5-dichloroaniline-2-sulphonyl chloride, m.p. 125-126°; p-toluidine-3-sulphonyl chloride, m.p. 85-86°; 2-chloro-ptoluidine-5-sulphonyl chloride, m.p. 127-128°; 3chloro-o-toluidine-5-sulphonyl chloride, m.p. 151-152°; m-4-xylidine-5-sulphonyl chloride, m.p. 85-86°; mphenylenediamine-4:6-disulphonyl chloride, m.p. 185° (decomp.); *m*-aminophenol-4:6-disulphonyl chloride, m.p. 181°; α-naphthylamine-7: ?-disulphonyl chloride, m.p. 216—218°; aniline-o-sulphonyl chloride, m.p. 72-74°; 6-chloroaniline-3-sulphonyl chloride, m.p. 77-80°; 3-chloro-o-toluidine-6-sulphonyl chloride, m.p. 154-155°; o-nitroaniline-p-sulphonyl chloride, m.p. 149-150°; m-nitro-compound, m.p. 136°; 1chloro-\beta-naphthylamine-6-sulphonyl chloride, m.p.

152—153°; 2:8-aminonaphthol-3:6-disulphonyl chloride, darkens above 250°; dichloro-4:4'-diaminodiphenylamine-2:2'- and -3:3'-disulphonyl chlorides, m.p. 132—133° and 76°, respectively; 2:?-dichloro-αnaphthylamine-4-sulphonyl chloride, m.p. 204—205°.

C. HOLLINS.

Manufacture of 4:6-dihydroxy-2-arylpyrimidines. I. G. FARBENIND. A.-G. (B.P. 309,033, 2.4.29. Ger., 3.4.28).—A malonic ester is heated with an amidine base. 4-Nitrobenzamidine, m.p. 215°, gives 4:6-dihydroxy-2-*p*-nitrophenylpyrimidine, m.p. 320° (decomp.), convertible into the 4:6-dichloro-compound, m.p. 266.° 4:6-Dihydroxy-2-phenylpyrimidine is similarly obtained in quantitative yield. C. HOLLINS.

Manufacture of naphthalene-2:3-dicarboxylic acid. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 332,122, 10.9.29).—2:3-Aminonaphthoic acid is converted by way of the diazo compound into the cyanonaphthoic acid, which is hydrolysed by dilute alkali to naphthalene-2:3-dicarboxylic acid, m.p. 236°. C. HOLLINS.

Purification of 2-aminoanthraquinone. W. M. MURCH and W. J. CAUWENBERG, ASSTS. to NAT. ANILINE & CHEM. Co. (U.S.P. 1,744,055, 21.1.30. Appl., 19.10.25). —Crude 2-aminoanthraquinone prepared from 2-chloroanthraquinone is treated with water and an oxidant (chromic acid) to oxidise impurities. C. HOLLINS.

Production of anthraquinone derivatives [ohalogenated aminoanthraquinones]. R. J. LOVE-LUCK, E. G. BECKETT, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 331,537, 28.12.28).—1:2- and 2:3-Aminoanthraquinonesulphonic acids are converted by potassium persulphate in sulphuric acid into mixtures of the corresponding nitroso- and nitro-compounds. The sulphonic group is then exchanged for chlorine, and reduction, preferably with sodium hydrogen sulphide, yields 2:1- and 2:3-chloroaminoanthraquinones, respectively. C. HOLLINS.

Manufacture of monoalkyl ethers of ethylene glycol. W. GIBSON and J. B. PAYMAN, ASSIS. to IMPERIAL CHEM. INDUSTRIES, LTD. (U.S.P. 1,774,089, 26.8.30. Appl., 7.9.29. U.K., 27.9.28).—See B.P. 322,037; B., 1930, 315.

Production of keten. H. DREYFUS (U.S.P. 1,773,970, 26.8.30. Appl., 27.5.26. U.K., 13.6.25).— See B.P. 262,364; B., 1927, 125.

Manufacture of sulphonic acids of 6-chloro-2amino-1-methylbenzene [6-chloro-o-toluidine]. F. HENLE and B. VOSSEN, ASSTS. to GEN. ANILINE WORKS, INC. (U.S.P. 1,773,706, 19.8.30. Appl., 30.4.28. Ger., 10.5.27).—See B.P. 290,229; B., 1929, 123.

Catalytic apparatus (B.P. 331,468).—See I. Methyl alcohol etc. (B.P. 330,918).—See II. Carbon disulphide (B.P. 333,090).—See VII. Tanning agents (B.P. 331,216).—See XV.

IV.—DYESTUFFS.

Mixer. ZAKARIAS.—See I. Fastness of colours. Stern.—See XIII.

See also A., Aug., 1044, *Physalis* dyes (KUHN and others). Colouring matter of boxthorn berries

ZEOHMEISTER and VON CHOLNOKY). 1051, Mercurated azo dyes derived from benzidine and o-tolidine (McMahon and Marvel).

PATENTS.

Dye composition [for domestic use]. W. KRITCHEVSKY, H. C. PRUTSMAN, and E. MORRILL (B.P. 331,491, 31.12.28).—To the usual ingredients of domestic dye preparations is added an alkylated naphthalenesulphonic acid, e.g., the isopropyl or n-butyl compound. C. HOLLINS.

Manufacture of acid wool dyes. I. G. FARBENIND. A.-G. (B.P. 312,175, 21.5.29. Ger., 18.5.28. Addn. to B.P. 299,721; B., 1930, 455).—A sulphonated 4-halogeno-1:8-naphthalic anhydride is heated in water, if desired under pressure, with ammonia or an amine. The resulting 4-aminonaphthalimidesulphonic acids are acid wool dyes; ammonia gives a yellow, p-toluidine a reddish-orange. C. HOLLINS.

Manufacture of acid wool dyes of the anthraquinone series. A. CARPMAEL. From I. G. FARBEN-IND. A.-G. (B.P. 331,217, 25.3.29).—A diazotised 1-aminoanthraquinone-2-sulphonic acid, carrying in the 4-position a halogen atom or an arylamino-group, is treated at 15—30° with a primary or secondary amine. The diazo group and the halogen, if present, are replaced by the new amino-residue, giving acid wool dyes. Diazotised 4-bromo-1-aminoanthraquinone-2-sulphonic acid is treated with aniline (grey to black), *cyclohexyl*amine (reddish-black), ethylamine (reddish-black), ethylaniline (reddish-grey); diazotised 1-amino-4anilinoanthraquinone-2-sulphonic acid gives with aniline a grey to black dye. C. HOLLINS.

Manufacture of blue vat dyes. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 331,697, 10.7.29. Addn. to B.P. 320,397; B., 1930, 277).—Halogenated indanthrones are improved in purity and fastness to chlorine by a treatment with manganese dioxide and sulphuric acid. The treatment may follow chlorination without isolation. C. HOLLINS.

Manufacture of anthraquinone derivatives [vat dyes]. I. G. FARBENIND. A.-G. (B.P. 309,193 and Addn. B.P. 309,454, [A] 6.4.29. Ger., 7.4.28, [B] 10.4.29. Ger., 10.4.28).—Yellow to brown vat dyes are obtained (A) by heating a 2-amino-3-cyanoanthraquinone in a solvent, *e.g.*, quinoline or pyridine, preferably in presence of copper, cuprous cyanide, cuprous bromide, etc., or (B) by heating a 2-halogeno-3-cyanoanthraquinone with cuprous cyanide in a solvent. Examples are 2-amino-3-cyano(or bromo)-anthraquinone (orange-yellow); brominated 2-amino-3-cyanoanthraquinone (yellow); 3-bromo-1:2-diamonoanthraquinone (chocolate-brown); 1:3-dibromo-2-aminoanthraquinone (yellow). C. HOLLINS.

Manufacture of [vat] dyes of the anthraquinone series. I. G. FARBENIND. A.-G. (B.P. 309,192, 6.4.29. Ger., 7.4.28).—A halogenated indanthrone (e.g., 3:3'dibromoindanthrone) is heated with cuprous cyanide in a solvent (quinoline). The product gives blue shades greener than those from the starting material.

C. Hollins.

Manufacture of vat dyes of the anthraquinone series. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 331,620, 30.4.29).—2-Thiol- or 2:6-dithiol-anthracene is condensed with 1-chloro-, 1-nitro-, or 1-diazoanthraquinone-2-carboxylic acid, and the resulting mono- or di-2-carboxyanthraquinonylthiolanthracene is heated with acid condensing agents (phosphorus pentachloride in trichlorobenzene) to give yellowish-brown vat dyes. C. HOLLINS.

Manufacture of vat dyes of the anthanthrone series. I. G. FARBENIND. A.-G. (B.P. 311,347, 9.5.29. Ger., 9.5.28. Addn. to B.P. 286,669; B., 1929, 674).— The products of the prior patent containing free aminogroups are acylated. *E.g.*, the compounds from monoor di-bromoanthanthrone and 1:5-diaminoanthraquinone, and from monobromoanthanthrone and 1:4diaminoanthraquinone, are benzoylated to give bluishgrey to greenish-blue vat dyes. C. HOLLINS.

Manufacture of [azo] dyes and application thereof. Soc. CHEM. IND. IN BASLE (B.P. 310,011, 19.4.29. Sw., 19.4.28).—Dyes obtained by coupling diazotised o-aminophenol-4:6-disulphonic acid with an unsulphonated arylpyrazolone are prechromed to give orange dyes for wool. C. HOLLINS.

Manufacture of azo dyes insoluble in water [ice colours and pigments]. O. Y. IMRAY. From I. G. FARBENIND. A.-G. (B.P. 331,247, 21.3.29).— 2:3-Hydroxynaphthoic 4-halogeno-2:5-dialkoxyanilide is coupled in substance or on the fibre with a non-sulphonated, non-carboxylated, diazo, tetrazo, or diazoazo compound. The dyes are especially fast to light. The 4-chloro-2:5-dimethoxyanilide is coupled, *e.g.*, with diazotised 4-chloro-o-toluidine (red), 2:5dichloroaniline (orange-brown), *m*-chloroaniline (brownorange); the 4-bromo-compound gives similar shades. C. HOLLINS.

Preparation of triarylmethane dyes. F. W. LINCH and E. H. RODD, Assrs. to BRIT. DYESTUFFS CORP., LTD. (U.S.P. 1,772,516, 12.8.30. Appl., 25.10.28. U.K., 17.11.27).—See B.P. 301,193; B., 1929, 165.

Preparation of triarylmethane dyes. E. H. RODD and F. W. LINCH, ASSTS. to BRIT. DYESTUFFS CORP., LTD. (U.S.P. 1,772,522-3, 12.8.30. Appl., [A] 15.12.26, [B] 2.2.28. U.K., [A, B] 17.4.26. Renewed [A] 30.12.29).—See B.P. 272,321; B., 1927, 598.

Vat dyes of the anthraquinone [dibenzanthrone] series. K. KRAUER and G. HESS, ASSTS. to Soc. CHEM. IND. IN BASLE (U.S.P. 1,774,443, 26.8.30. Appl., 10.10.27. Switz., 20.10.26).—See B.P. 279,479; B., 1929, 165.

β-Naphthylaminoaryloxy-fatty acids (B.P. 331,597).—See III. Diazo-types (B.P. 331,459).— See XXI.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Absorption of iron by various technical celluloses. K. CZAPLA (Faserforsch., 1930, 8, 55-89; Chem. Zentr., 1930, i, 1721).—The differing ability of cellulosic paper materials to absorb iron from solutions is of diagnostic value. Nearly all old papers give a positive reaction (due chiefly to the filling, dye, and size). Unbleached Finnish spruce cellulose, bleached aspen cellulose, and bleached strawstuff did not absorb iron. A. A. ELDRIDGE.

Testing of acetylcellulose in the film, lacquer, and artificial silk industries. W. FERMAZIN (Chem.-Ztg., 1930, 54, 605-606).-The water-absorptive power of acetylcellulose decreases with increasing acetic acid content. The absorptive power for 75% alcohol is greater, but decreases when the acetic acid content falls below 52%, thus giving a false impression of the moisture condition of the gel. The viscosity of acetone solutions depends on the acetic acid content, but the viscosity of a 2% solution in formic or acetic acid is proportional to the tensile strength of films of the material and is therefore preferable as a test of quality. The viscosity of solutions decreases rapidly on warming, and steeper curves are obtained with inferior products; similarly, great variation of viscosity with pressure is indicative of poor quality. The solubility (measured by titration of a 1% acetone solution with a non-solvent, e.g., benzene, water) may be correlated with the absorbability and the tensile strength of the dry material, but is independent of the acetic acid content.

E. LEWKOWITSCH.

Reaction variables of the alkaline pulping processes. C. E. CURRAN and M. W. BRAY (Ind. Eng. Chem., 1930, 22, 830-836).-The effect of varying the conditions in the soda-, sulphate-, and semi-chemical pulp processes has been investigated. Temperature affects only the rate of reaction. Increased concentration of reagent increases the rate of reaction, lowers the yield, and gives a weaker pulp. Accelerated rate of reaction combined with good pulp strength is attained by increasing the ratio of reagent to wood, the concentration of the reacting liquor being kept low. The use of sulphide to replace part of the caustic soda gives more easily bleached and stronger pulps than those cooked with caustic soda alone. Small-scale cooks have been made with southern yellow pines, yielding strong kraft T. T. Potts. pulps of good colour.

Effect of alkalis on rosin-sizing of paper. CHINTSCHIN (Papier-Fabr., 1930, 28, 517—520).—The effect is to increase the adsorptive power of the cellulose, resulting in increased sizing. The use of Delthirna and other fully saponified sizes is equivalent to the addition of alkali to a normal sizing operation. The effect is particularly of value when sizing takes place in a hard water. A method for the determination of adsorptive power of fibres is outlined. T. T. Ports.

Pine rosin in mixtures. DONATH.-See XIII.

See also A., Aug., 1014, Viscosimeter (Kämpf and Schrenk).

PATENTS.

Manufacture of cellulose esters. E. F. EHRHARDT and G. B. ELLIS. From Soc. DES USINES CHIM. RHÔNE-POULENC (B.P. 331,260, 31.12.28. Addn. to B.P. 328,588; B., 1930, 655).—Cellulose acetate crotonates are obtained by esterifying cellulose, preferably pretreated with acetic acid with or without catalysts, with crotonic anhydride and acetic acid at 15—75° in presence of sulphuric acid, a sulphonic acid, zinc chloride, or other catalyst. C. HOLLINS. Manufacture of unsaturated arylcellulose esters. H. T. CLARKE and C. J. MALM, Assrs. to EASTMAN KODAK CO. (U.S.P. 1,739,210, 10.12.29. Appl., 4.5.27).--Mercerised and dried cellulose fibre, or viscose rayon, is heated with crotonic acid in chlorobenzene at 155—157°. After 48 hrs. about 5% of crotonyl group has been introduced, and the product may then be acetylated etc. in the usual manner. C. HOLLINS.

Compositions comprising cellulose derivatives [plasticisers]. BRIT. CELANESE, LTD. (B.P. 312,606, 10.5.29. U.S., 28.5.28).—Alkyl ethers of acylated aminophenols, e.g., acet-o-anisidide, acetophenetidides, butyr-o-anisidide, or mixtures of these, are used as plasticisers for cellulose derivatives (acetate, propionate, ethyl ether). C. HOLLINS.

Cellulose derivative compositions. CELLULOID CORP. (B.P. 308,657, 25.3.29. U.S., 23.3.28).—The compositions comprise cellulose esters or ethers (cellulose acetate), unpolymerised compounds containing a vinyl group, e.g., organic or inorganic vinyl esters, styrene, or the compounds obtained by dehalogenating vinyl halides, and auxiliary organic compounds having a solvent or plasticising action on the cellulose derivative, e.g., alcohols, esters, benzene, toluene. Fillers, pigments, gums, resins, etc. may also be added to form lacquers or plastics. L. A. COLES.

Manufacture of films or sheets. CELLULOID CORP. (B.P. 310,540, 26.4.29. U.S., 27.4.28).—The films etc. are prepared by the extrusion of solutions of cellulose acetate etc., at a temperature somewhat below the b.p. of the solvent employed, into an atmosphere maintained at a raised pressure, the quantity of solvent or mixture of solvents being such that the solution does not flow readily at the ordinary temperature. L. A. COLES.

Manufacture of artificial filaments, films, and the like. BRT. CELANESE, LTD. (B.P. 310,046, 18.4.29. U.S., 21.4.28).—A 25% solution of cellulose acetate of acetyl value $52 \cdot 5$ —56%, preferably $54 \cdot 5\%$, in a mixture of 2—5% or more of methyl alcohol and at least 70% of acetone, which has a low viscosity and an improved capability of being drawn out, is dry-spun at 50—60°.

F. R. ENNOS.

Mixed [wool-acetate silk] fibre. ACETA GES.M.B.H. (B.P. 319,354, 4.9.29. Ger., 22.9.28).—Wool is mixed with artificial fibres of nitroacetylcellulose containing about 1—2% N and acid equivalent to about 54% of acetic acid. Such a mixture may be subjected to the ordinary hot vat treatments, such as are used in wool dyeing, and to carbonisation, as with aluminium chloride, without damage. F. R. ENNOS.

Manufacture of artificial threads from cellulose esters or cellulose ethers. ACETA GES.M.B.H. (B.P. 310,842, 17.4.29. Ger., 1.5.28).—The tensile strength of the filaments of cellulose esters and ethers produced by the wet-spinning process is increased by the addition to the precipitating bath, containing a salt having a swelling action (thiocyanates, zinc chloride), of a colloid substance such as molasses, sulphite-cellulose lye, a tanning agent, soluble starch, albumin, a soluble synthetic resin, or a solution of degraded keratin.

F. R. ENNOS.

British Chemical Abstracts-B.

944

Treatment of textile filaments, yarns, threads, or the like. BRIT. CELANESE, LTD., and W. I. TAYLOR (B.P. 332,263, 11.1.29).—A saponifying agent (aqueous or alcoholic caustic soda or potash, alkali carbonate, silicate, or phosphate) is intermittently applied by suitable mechanical means to the cellulose ester filaments in the course of their production, so that multicoloured or cross-dyed effects are obtainable with dyes having a different affinity for the saponified and unsaponified parts of the filaments. F. R. ENNOS.

Manufacture or treatment of (A) materials made of or containing cellulose esters or ethers, (B) textile or other material. BRIT. CELANESE, LTD., and G. H. ELLIS (B.P. 332,187 and 332,231, 5.1.29).-Structureless cellulose ester products are rendered resistant to the delustring action of hot aqueous liquids (A) by incorporating a solvent or gelling agent (e.g., resorcinol, quinol, cresols, diacetone alcohol, ptoluenesulphonamides, glycol ethers, etc.) with the spinning solution, or the precipitating bath, or with the fibre after its production, and then subjecting to the action of dry steam under pressure for upwards of $\frac{1}{2}$ hr.; (B) by treating with dry steam for upwards of 1 hr. at 20-40 lb./in.² above atmospheric pressure; in the latter case the treatment also serves to restore the lustre to products which have been delustred by hot aqueous liquids. F. R. ENNOS.

Manufacture of [crimped] artificial filaments or fibres. S. G. BARKER, and BRIT. RES. ASSOC. FOR WOOLLEN & WORSTED INDUSTRIES (B.P. 332,353, 10.6.29). —Artificial filaments having the crimp or waviness of wool are produced by maintaining the spinning orifice in vibration. F. R. ENNOS.

Improvement of cellulose raw material. ZELL-STOFFFABR. WALDHOF, O. FAUST, and V. HOTTENROTH (B.P. 317,046, 23.7.29. Ger., 9.8.28. Addn. to B.P. 301,088; B., 1930, 456).—The concentration of the alkali lye used in the process is reduced when the cellulose is treated at lower temperatures.

F. R. ENNOS.

[Production of] textile fabrics [having crêpe-like or pebbled effects.] H. DREYFUS (B.P. 332,903, 29.4.29).

Imitation fur. G. ROMANE (B.P. 310,467, 3.4.29. Fr., 26.4.28).

Drying of seamless tubular bodies made of cellulose. KALLE & Co. A.-G. (B.P. 319,771, 12.9.29. Ger., 28.9.28).

[Tension device for] manufacture of artificial threads. COMPTOIR DES TEXTILES ARTIFICIELS SOC. ANON., Assees. of W. H. BRADSHAW and G. P. HOFF (B.P. 318,258, 29.8.29. U.S., 1.9.28).

Manufacture of paper, pulpboard, etc. R. MARX (B.P. 333,167, 1.5.29).

Coating of paper. A. E. WHITE. From MEAD PUMP & PAPER Co. (B.P. 333,034, 15.7.29).

High-gloss drying apparatus for papers. I. G. FARBENIND, A.-G., and S. KAMINSKI (B.P. 333,662, 31.5.29).

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Fastness of colours. STERN.—See XIII.

See also A., Aug., 991, Adsorption of mineral colours by wool fibres (ILJINSKI and Kozlov).

PATENTS.

Manufacture of azo dyes on the fibre. I. G. FARBENIND. A.-G. (B.P. 308,660, 25.3.29. Addn. to B.P. 306,844; B., 1930, 902).—Textile materials are printed with a paste containing a coupling component and a diazoamino-compound prepared as in the prior patent, and the colour is developed, after drying or steaming if desired, in an acid bath. Examples are pastes containing: 5-nitro-o-anisidine \rightarrow dimethylamine with 2:3-hydroxynaphthoic *p*-anisidide (bordeaux); α aminoanthraquinone \rightarrow dimethylamine with the α naphthylamide (red); dianisidine \rightarrow piperidine with the anilide (blue); 5-nitro-o-anisidine \rightarrow dimethylamine with acetoacet-tolidide (reddish-yellow).

C. HOLLINS.

Manufacture of water-insoluble azo dyes on the fibre [ice colours]. I. G. FARBENIND. A.-G. (B.P. 304,326, 18.1.29. Ger., 20.1.28. Addn. to B.P. 284,247; B., 1929, 637).—2: 3-Hydroxynaphthoic β -naphthylamide is coupled on the fibre with diazotised monoaroylated *m*-phenylenediamines carrying in 4- and 6-positions either two halogen atoms or a halogen atom and a methyl group, *e.g.*, 5-chloro-2-benzamido-*p*-toluidine, m.p. 158°, prepared by reduction of benzoic 5-chloro-4-nitro-otoluidide, m.p. 172°, the nitration product of benzoic 5-chloro-o-toluidide, m.p. 176°. The dyeings are fast to bucking with 0.35% sodium hydroxide at 1.5 atm. pressure. C. HOLLINS.

Dyeing of cellulose acetate silk. R. METZGER, Assr. to GEN. ANILINE WORKS, INC. (U.S.P. 1,738,660, 10.12.29. Appl., 27.9.27. Ger., 11.7.24).—Acetate silk is dyed with suitable insoluble dyes in conjunction with a sulphonated mineral oil. C. HOLLINS.

Compositions for decolorising dyed fabrics. W. KRITCHEVSKY (B.P. 331,194, 22.12.28).—The composition, for domestic use, comprises a hyposulphite or formaldehyde-sulphoxylate together with a solid acid or a salt having an acid reaction (oxalic or tartaric acid, aluminium sulphate, sodium hydrogen sulphite) and a sodium alkylnaphthalenesulphonate. Zinc dust may replace the hyposulphite. C. HOLLINS.

Rendering fibres insectproof [mothproofing]. R. M. RITTER (B.P. 313,043, 26.4.29. U.S., 5.6.28).— Alkylnaphthalenesulphonic acids, preferably fixed by means of mordant metal salts, are used to protect animal fibres etc. against moths. The butyl, amyl, and propyl compounds are mentioned. C. HOLLINS.

Dyeing process. A. ESCAICH and J. P. WORMS (U.S.P. 1,774,428, 26.8.30. Appl., 20.11.23. Ger., 25.11.25).—See B.P. 230,128; B., 1925, 352.

Dyeing cellulose ester and ether. L. G. LAWRIE, F. W. LINCH, and E. H. RODD, Assrs. to BRIT. DYE-STUFFS CORP., LTD. (U.S.P. 1,772,515, 12.8.30. Appl., 21.6.28. U.K., 5.7.27).—See B.P. 297,897; B., 1928, 891.

Dyeing and printing cellulose esters and ethers. E. FISCHER and C. E. MÜLLER, ASSTS. to GEN. ANILINE WORKS, INC. (U.S.P. 1,765,142, 17.6.30. Appl., 20.4.27. Ger., 23.4.26).—See B.P. 269,934; B., 1928, 121.

Printing with vat dyes. E. PFEFFER, Assr. to GEN. ANILINE WORKS, INC. (U.S.P. 1,744,140, 21.1.30. Appl., 22.1.29. Ger., 26.1.28).—See B.P. 304,787; B., 1930, 416.

Production of [pattern effects on] fabrics or articles [containing cellulose acetate]. G. H. ELLIS and R. J. MANN, ASSTS. to CELANESE CORP. OF AMERICA (U.S.P. 1,773,975, 26.8.30. Appl., 17.5.27. U.K., 15.6.26).—See B.P. 277,414; B., 1927, 874.

[Re-lustring] treatment of threads, fabrics, or other materials composed of or containing artificial filaments and products. C. W. PALMER and S. M. FULTON, ASSTS. to CELANESE CORP. OF AMERICA (U.S.P. 1,774,184, 26.8.30. Appl., 16.11.25. U.K., 26.5.25).— See B.P. 259,266 ; B., 1926, 976.

Dye jigger machines. Associated Dyers & CLEANERS, LTD., and H. J. CRICK (B.P. 333,447, 9.10.29).

Dye jigs. J. MACE (B.P. 333,366, 13.7.29).

Apparatus for dyeing piece goods. A. A. HUDSON (B.P. 332,979, 14.5. and 25.7.29).

[Shrinking] treatment of cloth. A. A. LINDQVIST (B.P. 319,236, 16.5.29. Swed., 18.9.28).

Singeing of textile fabrics and yarns. J. CHADWICK & Co., LTD., and F. SHARPLES (B.P. 333,084, 18.9.29).

Deodorising hair, feathers, etc. [by means of ozone]. W. W. TRIGGS. From AMER. HAIR & FELT Co. (B.P. 333,197, 4.4.29).

Azo dyes [on woo1] (B.P. 310,011).—See IV. Mixed fibre (B.P. 319,354).—See V.

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

Reaction of calcium cyanamide with carbon dioxide at high temperatures. H. H. FRANCK and B. MEPPEN (Z. angew. Chem., 1930, 43, 726–732).— At 500–1100° carbon dioxide reacts with calcium cyanamide as follows: $2CaCN_2+CO_2=2CaO+2N_2+3C$. At the higher temperatures the liberated carbon is converted into carbon monoxide by excess of carbon dioxide. Carbon monoxide reacts slowly with cyanamide below 1000° as follows: $CaCN_2+CO=CaO+2C+N_2$. A. R. POWELL.

Fluoaluminates of the alkali metals. R. H. CARTER (Ind. Eng. Chem., 1930, 22, 888-889).-The fluoaluminates of sodium, potassium, lithium, and ammonium were prepared in the laboratory and their solubilities and the $p_{\rm H}$ of the solutions determined. The potassium salt can be readily obtained with a yield of 90% by adding hydrofluoric acid to a solution of aluminium sulphate containing potassium carbonate. The mixture is boiled and the fluosilicate separates as a gelatinous precipitate. If hydrofluosilicic acid is used, silica is precipitated, giving a lighter compound suitable for dusting as insecticide. If an alkaline solution of alumina 18 used as starting point products are obtained giving a practically neutral reaction to phenolphthalein, and these should be safer in use than are the fluosilicates.

C. IRWIN.

Solubilities of fluosilicates in water. R. H. CARTER (Ind. Eng. Chem., 1930, 22, 886-887).—The solubility curves of sodium, potassium, and barium fluosilicate between 0° and 100° were determined. The solubilities decrease in the order mentioned. Pure calcium fluosilicate is much more soluble than are these salts and is too soluble for use as insecticide. The calcium fluosilicate of commerce, which has been tested in this way, appears to contain only a small percentage of fluosilicate. C. IRWIN.

Determination of small quantities of carbon monoxide. ANON. (Jahresber. VII., Chem.-Tech. Reichsanst., 1928, 195—201; Chem. Zentr., 1930, i, 1977—1978).—By the use of dry carbon monoxide, a relatively high gas velocity, and finely-divided cupric oxide deposited on quartz, quantitative oxidation to carbon dioxide occurs, and the adsorption of this gas on the small amount of cupric oxide is minimal. The gas is completely removed by passing air free from carbon dioxide for 20 min. at 350°. A. A. ELDRIDGE.

Nitrous oxide for anæsthesia. V. E. HENDERSON and G. H. W. LUCAS (Canadian Chem. Met., 1930, 16, 211—212).—Passage of nitrous oxide through ordinary litmus solution under the conditions of the U.S.P. test causes a colour change by displacing carbon dioxide. Since, in addition, litmus is not very sensitive towards ammonia, the following alternative test is proposed. The change in $p_{\rm H}$ produced by bubbling 2000 c.c. of the gas through 100 c.c. of freshly boiled 0.00005% methylred solution should not be greater than that produced by 0.1 c.c. of 0.01*N*-hydrochloric acid or -ammonia. Damage to the lungs, observed in certain animal experiments, was due to dryness of the gas, and not to any harmful constituent. H. E. F. NOTTON.

Utilisation of waste steam for sulphate production. REUTER.—See I. Diffusion of insoluble carbonates. RAE.—See VIII. Determination of free lime. BESSEY.—See IX. Manganese arsenate insecticide. DEARBORN.—See XVI.

See also A., Aug., 979, Phosphorescent zinc sulphide (COUSTAL). 997, System sodium sulphatesodium carbonate-water in natural soda lakes (KURNAKOV and MAKAROV). 1003, Synthesis of ozone (BREWER and WESTHAVER).

PATENTS.

Denitrating mixtures of nitric and sulphuric acids and concentrating nitric acid. J. L. BENNETT, Assr. to Hercules Powder Co. (B.P. 333,264, 5.2.29. U.S., 26.10.28).-A mixture of aqueous nitric and sulphuric acids or other dehydrating agent, such as phosphoric acid or anhydrous sodium sulphate, is partly denitrated by passing it down a tower in counterflow to a mixture of nitric acid vapour and steam. The partly denitrated mixture is heated in a vessel provided with steam coils, so as to generate steam and nitric acid vapour, a portion of the steam being used to denitrate further quantities of the mixture and to separate the nitric acid from the balance of the steam. Only sufficient steam is introduced into the tower to prevent undue dilution of the nitric acid, the vapours of which, on leaving the top of the tower, are condensed in another vessel. W. J. WRIGHT.

Apparatus for decomposition of thiocyanic acid and its salts. C. J. HANSEN, Assee. of H. KOPPERS A.-G. (B.P. 310,549, 27.4.29. Ger., 28.4.28).—Corrosion of chromium-nickel steel apparatus, employed for the decomposition of thiocyanic acid or its salts by acid at normal or high temperatures for the production of ammonium salts, is avoided if sulphurous acid, or a liquor containing it in a free or combined state, is used for the decomposition. W. J. WRIGHT.

Manufacture of complex fluoboro-organic acids and salts thereof. I. G. FARBENIND. A.-G. (B.P. 316,987, 7.8.29. Ger., 7.8.28).—Boric acid is dissolved in hydrofluoric acid, and an organic acid is added to the solution, or hydrofluoric acid is caused to act on a mixture of boric acid and an organic acid or on a compound of boric acid with an organic acid, *e.g.*, boroacetic anhydride. W. J. WRIGHT.

Catalytic oxidation of ammonia. SELDEN Co., Assees. of A. O. JAEGER (B.P. 313,153, 10.5.29. U.S., 9.6.28).—The catalyst comprises a zeolite-like body the base of which has been exchanged with a metal oxide having catalytic activity and the resulting product treated with a solution of a salt of a metal acid of group V or VI; e.g., sodium cerium iron aluminosilicate is treated with a dilute solution of a manganese, silver, copper, cobalt, manganese, lead, or zinc salt and then with a 1% solution of ammonium vanadate, tungstate, molybdate, or chromate. A. R. POWELL.

Manufacture of ammonium chloride. J. I. BRONN, and CONCORDIA-BERGBAU A.-G. (B.P. 333,098, 4.10.29).—Dilute hydrochloric acid solutions are boiled, and the vapours are superheated to 150° and mixed with ammonia vapours similarly superheated. Solid ammonium chloride is deposited and the hot steam obtained as a by-product may be utilised in the process described in B.P. 308,028 (B., 1929, 433). More efficient collection of the ammonium chloride is effected by carrying out the reaction in a centrifuge.

A. R. POWELL.

Preparing magnesium hydrate tablets. W. C. McGowan, Assr. to MILNESIA INTERNAT., INC. (B.P. 310,919, 5.2.29. U.S., 3.5.28).—To obtain tablets of uniform smoothness, which readily disintegrate in the mouth without grittiness, the moist hydroxide is granulated, diluents such as calcium carbonate or starch are added, and the product is formed into tablets. W. J. WRIGHT.

Filtering material. H. BLUMENBERG, JUN. (U.S.P. 1,734,197, 5.11.29. Appl., 15.12.27).—Copper sulphate and calcium hypochlorite are ground together in molecular proportions. This material is mixed with cellular material such as diatomaceous earth or pumice in the ratio 100 : 30. Mineral distillates may be purified by treatment with 0.5-5% of this mixture, water with 25lb. per million gals., and sewage or industrial waste liquors with 100-500 lb. per million gals. T. A. SMITH.

Manufacture of metal carbamates. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 332,584, 20.3.29).— Calcium, barium, and zinc carbamates are obtained by double decomposition of salts of these metals with ammonium carbamate in ethyl- or methyl-alcoholic solutions. Sodium carbamate is similarly obtained from solutions of sodium chloride in liquid ammonia. A. R. POWELL.

Manufacture of solid carbon dioxide. K. C. PEGGS (B.P. 333,212, 6.5.29).—Instead of allowing liquid carbon dioxide to expand through valves or orifices, it is caused to expand, when the process has started, through the mass of the already formed solid product, thereby filling the pores and producing a denser material. W. J. WRIGHT.

Production of carbon disulphide. I. G. FARBENIND. A.-G. (B.P. 333,090, 24.9.29. Ger., 17.11.28).—To enable the residue from the retorts used in the manufacture of carbon disulphide to be removed continuously by mechanical means, layers of granular material, *e.g.*, broken brick, pumice, lava, coke, are introduced in alternate layers with the wood charcoal.

A. R. POWELL.

Catalytic oxidation of ammonia. A. O. JAEGER, Assr. to SELDEN Co. (U.S.P. 1,765,352, 17.6.30. Appl., 14.4.28).—See B.P. 309,583; B., 1930, 764.

Chemical decomposition of crude potash salts. F. RÜSBERG, ASST. to KALI-CHEM. A.-G. (U.S.P. 1,744,040, 26.8.30. Appl., 4.9.29. Ger., 6.9.28).—See B.P. 314,725; B., 1929, 681.

Manufacture of calcium molybdate. A. Kissock (U.S.P. 1,763,712, 17.6.30. Appl., 6.11.26).—See B.P. 280,240; B., 1929, 393.

Preparation of magnesium dichromate. G. KRÄNZLEIN and A. VOSS, ASSTS. to GEN. ANILINE WORKS, INC. (U.S.P. 1,774,018, 26.8.30. Appl., 10.5.27. Ger., 22.6.25).—See F.P. 617,235; B., 1927, 814.

Production of aluminium compounds. T. R. HAGLUND, Assr. to INTERNAT. PATENT CORP. (U.S.P. 1,772,936, 12.8.30. Appl., 6.4.25. Swed., 17.4.24).— See B.P. 232,549; B., 1925, 997.

Catalysts for the catalytic production of methyl alcohol and other oxygenated organic compounds from oxides of carbon and hydrogen. R. G. FRANK-LIN, Assr. to IMPERIAL CHEM. INDUSTRIES, LTD. (U.S.P. 1,774,432, 26.8.30. Appl., 13.10.27. U.K., 15.11.26).— See B.P. 290,399 ; B., 1928, 523.

Production of oxygen and nitrogen. G. CICALI (U.S.P. 1,772,856, 12.8.30. Appl., 20.6.25. It., 16.2.25). —See B.P. 248,977; B., 1926, 406.

Precipitation of boron. A. E. VAN ARKEL, Assr. to N.V. PHILIPS' GLOEILAMPENFABR. (U.S.P. 1,774,410, 26.8.30. Appl., 18.8.26. Holl., 5.10.25).—See B.P. 264,953; B., 1927, 252.

Reduction of carbon monoxide (U.S.P. 1,741,306– 8). Catalyst for methyl alcohol synthesis (U.S.P. 1,738,971).—See III. Salts of antimonic and stibinic acids (B.P. 309,184).—See XX.

VIII.—GLASS; CERAMICS.

Progress report on effect of furnace gases on quality of enamels. A. I. ANDREWS and E. A. HERTZELL (J. Amer. Ceram. Soc., 1930, 13, 522-529).— The effects of firing ground- and cover-coat enamels in atmospheres of sulphur dioxide, city gas, nitrogen, and carbon dioxide were studied. Variations in the composition of ground-coat enamels had little effect on resistance to attack by sulphur gases. Similar variations in the cover coats, however, were more effective, but further work is needed to define the relationship clearly. The work showed that the presence of unburned or partially burned gas and sulphur dioxide in furnace gases is detrimental to enamels. F. SALT.

Formation of seeds and bubbles in glass pots. W. M. COHN (J. Amer. Ceram. Soc., 1930, 13, 555-559). —The production of bubbles or seeds in glass is related to the variation in the porosity of the pots, which increases up to a certain maximum and then falls to zero. For the removal of all gases from the glass melt, the refractory material must have a certain porosity throughout the melting operation. Alternatively, porous fireclay rods may be introduced into the melt. F. SALT.

Felspars and their peculiarities as ceramic solvents. A. S. WATTS (J. Amer. Ceram. Soc., 1930, 13, 550—554).—Brief notes are given on the constitution and mode of occurrence of felspar minerals and on associated minerals. Chemical analysis is shown to be an unreliable guide to the classification of felspars. A method of classification is proposed which is based on the fusion behaviour of samples of felspars, with and without additions of quartz, kaolin, and ball clay.

F. SALT.

Impurities in commercial felspars often overlooked by enamellers. J. R. CRANDALL (J. Amer. Ceram. Soc., 1930, 13, 530–531).—Eight commercial felspars, varying in chemical composition from 13.32 to 9.06% K₂O and from 4.14 to 2.08% Na₂O, were examined for impurities. Fusion tests showed small black or brown specks on the fused surface of certain felspars, due to the presence of garnet, hornblende, tourmaline, or biotite mica. Muscovite mica readily goes into solution and therefore gives no trouble in the finished enamel. F. SALT.

Acid-resisting, white, dry-process cast-iron enamels. A. I. ANDREWS (J. Amer. Ceram. Soc., 1930, 13, 509—521).—In the development of such enamels, additions were made systematically to two simple three-component systems, viz., the sodium oxideboric oxide-silica and the sodium oxide-lead oxidesilica systems. Two tests were applied to the enamels as developed: (a) the "acid spot" test, using a 7% solution of citric acid; (b) the solubility test, using hot 20% hydrochloric acid. The best enamel developed from the point of view of acid-resistance contained 18 Na₂O, 34 PbO, 48 SiO₂, with 15% SnO₂. The fineness of grinding, firing temperature, smelting conditions, and rate of cooling are without effect on the acid-resistance of dry-process enamels. Fluorine compounds are necessary to produce opacity, but they reduce the resistance to acids. F. SALT.

Lead content of the glazes on pottery manufactured in Ukraine. W. A. UGLOW, W. A. REBERG, and M. W. BOLTINA (Z. Unters. Lebensm., 1930, 59, 379-394).—The influence of boron, lead oxide, soda, potash, etc. on the properties of glazes is briefly reviewed.

An account is given of the preparation and application of lead glazes of low m.p., and attention is drawn to the dangers connected with this method. The methods used for testing glazes for soluble lead vary considerably as regards the nature and concentration of the acid and the time and temperature of extraction and the consequent discrepancies in the reported values are enumerated. The toxicity of Ukraine pottery is compared with that of ware from other countries. The utensils were tested by filling with 4% acetic acid and boiling for $\frac{1}{2}$ hr., lead being determined in the extract by adding a known amount of potassium dichromate and titrating the excess iodometrically. More than 600 analyses were made on all classes of ware. After six extractions some articles still gave appreciable amounts of lead, although the first (average 102 mg./litre) was always higher than any subsequent extraction (average $37 \cdot 2$ mg./litre). Individual samples showed great variation owing to lack of uniformity in the composition and methods of applying the glaze. The results indicated that many kinds of pottery gave undesirably large amounts of soluble lead, and recommendations are made for mitigating the trouble, such as a preliminary boiling with vinegar, whereby the amount of lead subsequently dissolved would be reduced by 60-70%. H. J. DOWDEN.

Grain size of ceramic bodies. V. SKOLA (Feuerfest, 1930, 6, 81–85).—The problem of grading ground material so as to produce a mixture of maximum density was studied both mathematically and practically. In the ideal case, the voids formed by one fraction will be filled by the next smaller fraction. The grading which most nearly approached this condition was: 4-2 mm. $43 \cdot 9\%$, 1-2 mm. $10 \cdot 9\%$, $0 \cdot 5-1$ mm. $12 \cdot 5\%$, $0 \cdot 2-0 \cdot 5$ mm. $11 \cdot 1\%$, $0 \cdot 12-0 \cdot 2$ mm. $9 \cdot 4\%$, $0 \cdot 06-0 \cdot 12$ mm. $6 \cdot 9\%$, and < 0.06 mm. $5 \cdot 2\%$. F. SALT.

Effect of various substances on diffusion of kaolin and certain insoluble carbonates. J. RAE (Pharm. J., 1930, 125, 223-224).—An account of some tests on the influence of added soluble substances on the rate of settling of kaolin and of bismuth, calcium, and magnesium carbonates in various media. S. I. LEVY.

Method for determining the loss of weight of clays during firing. W. R. MORGAN (J. Amer. Ceram. Soc., 1930, 13, 561—565).—By means of simple apparatus, consisting essentially of a balance from which a sample could be suspended in an electric furnace below, the progress of dehydration and oxidation was determined by the loss of weight of the sample during the heating operation. With different clays and bodies, the total loss of weight varied considerably (from 4 to 11%), but the losses in any temperature range expressed as a percentage of the total weight lost at 982° showed a much closer relationship. F. SALT.

Clay sewer-pipe manufacture. IX. Method of checking flue-gas analyses and its application to ceramic kilns. E. A. HERTZELL. X. Measurement of moisture loss in kilns. R. L. BLESSING. XI. Cold-junction compensator for outdoor pyrometer installations. R. E. ARNOLD (J. Amer. Ceram. Soc., 1930, 13, 566-570, 571-579, 580-586; cf. B., 1929, 644).—IX. The use of Bato's formula to

check the results of gas analysis obtained with the Orsat apparatus is explained. Calculations were applied to four tests on kilns fired with coal, natural gas, and fuel oil.

X. Data and experiences are presented on an attempt to determine, by loss-of-weight methods, the completion of the water-smoking period and to ascertain the point at which increased rate of heating would be safe. The results indicated two essentials for correct watersmoking, viz., strong draught during the early stages, and accurate control of the top temperatures. Measurement of loss of weight did not indicate the critical point in the water-smoking operation.

XI. A simple and inexpensive instrument for multiplekiln installations is described. F. SALT.

Corundum and silicon carbide. R. SCHNEIDLER (Chem.-Ztg., 1930, 54, 625-627).-Batch working is preferred in the electrothermic manufacture of corundum because the removal of the impurities in the bauxite is easier and the physical structure of the product better. Furnaces are usually constructed of strong sheet iron, unlined, as the slag forms an excellent protection. The floor is covered with tar, coal, etc. Coke is laid upon this and the bauxite gradually added and melted by moving the electrodes, by hand or automatically, the current being kept at 6000 amp. and 90-120 volts. After completion of the process the cooled block of corundum is lifted out vertically. The usual yield is 55-60% of first-class corundum, calculated on bauxite. The usual corundum of commerce contains 95-97% Al₂O₃; inferior qualities are darkened in colour by iron and titanium. Silicon carbide is produced by the reduction of quartz sand containing at least 98% SiO2 with good-quality coke or anthracite at 1800°. It is decomposed by heating to 2200°, such decomposition being catalysed by the presence of iron or other metals, which must therefore be excluded as far as possible. A resistance furnace built of refractories with a resistor core of coke is used and the current must be kept uniform. C. IRWIN.

See also A., Aug., 1010, Decomposition of aluminous silicates for analysis (FINN and KLEKOTKA).

PATENTS.

Stratified bodies, e.g., strengthened glass. TRIPLEX SAFETY GLASS Co., LTD., and J. WILSON (B.P. 332,551, 20.4.19 and 30.1.30).—A sheet of cellulose ester plastic, e.g., celluloid, is united to glass already coated with gelatin, by immersing the surfaces in an inert liquid of relatively high b.p. and heating and pressing the plates together. The inert liquid, e.g., cyclohexane, may contain also solvents, e.g., glycol ethers, tolyl phosphate, alkyl phthalates.

C. A. KING.

Firing of ceramic ware. A. S. WATTS (B.P. 332,692, 7.6.29).—The various operations of twice firing ceramic ware together with the necessary intervening stages of cooling are conducted in a tunnel kiln of sectional construction. The time of heat-treatment in the different zones is controlled by the length of the zones, which may be altered by the addition or removal of further kiln sections. C. A. KING.

Burning of bricks, tiles, and the like. A. HEUER (B.P. 310,315, 8.2.29. Ger., 23.4.28).—Bricks etc. of normal porosity and high strength are made by mixing intimately a high-grade fuel, e.g., coke, in a finely-divided state with the raw materials in nearly sufficient quantity to provide the necessary heat for the burning process. Less than this quantity of fuel may be mixed with the materials and the requisite additional fuel is then placed between the bricks etc. [Stat. ref.] F. SALT.

British Chemical Alstructs-B.

Preventing deposition of carbon in and upon ceramic materials which come into contact with [furnace] gases at high temperatures. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 330,561, 7.3.29).—Copper or a copper compound is added to the materials (e.g., refractory bricks) during any stage of manufacture, or to the finished product, by impregnating, spraying, brushing, etc. F. SALT.

Treatment of carbonised clays and of refractory units prepared from such clays. W. McBRYDE (B.P. 330,745, 24.5.29).—The free carbon contained in refractory units made from carbonised clays produced by the process described in B.P. 149,440 (B., 1920, 658A) is removed by oxidation, preheated atmospheric air being introduced into the kiln during or immediately after the firing of the units. F. SALT.

Tunnel kiln. P. A. MEEHAN, Assr. to AMER. DRESS-LER TUNNEL KILNS, INC. (U.S.P. 1,764,460, 17.6.30. Appl., 3.4.28).—See B.P. 312,786; B., 1929, 645.

Processes and apparatus for tempering glass. Soc. ANON. DES MANUF. DES GLACES ET PROD. CHIM. DE ST.-GOBAIN, CHAUNY, ET CIREY (B.P. 333,839—40 and 333,843, [A] 30.11.29, [B, C] 2.12.29. Fr., [A] 7.8.29, [B] 8.8.29, [C] 21.9.29).

[Machine for] manufacture of [hollow] glassware. A. SCHILLER (B.P. 312,159, 7.5.29. Ger., 21.5.28).

Treatment of cast glass plates and sheets [to prevent buckling]. A. BRANCART (B.P. 333,500, 14.2.30. Belg., 23.2.29).

[Laminated] safety glass sheet and its manufacture. J. NEWTON (B.P. 333,242, 8.2.29).

Manufacture of ceramic bodies [from strands]. HERMSDORF-SCHOMBURG ISOLATOREN GES. (B.P. 317,364, 24.5.29. Ger., 14.8.28).

Grinding wheels. W. W. TRIGGS. From NORTON Co. (B.P. 333,658, 29.5.29).

IX.—BUILDING MATERIALS.

⁴⁷ Glycerol method for determination of free lime. G. E. BESSEV (J.S.C.I., 1930, 49, 360—362 r).— A modification of the glycerol method of determining free lime in cements and sand-lime bricks is described, in which the free lime is completely extracted by warming for several hours at 60—80° with glycerol, and is then titrated, after dilution with alcohol, by an alcoholic solution of benzoic acid, using phenolphthalein as indicator. It is suggested that this modification has certain advantages over previous methods and is simpler to carry out. The applicability and accuracy of this and previous methods are discussed. Relation of the strengths of cements of various binding powers. BURCHARTZ (Mitt. Materialprüf, 1930, 124-125).-The tensile, compression, and bending strengths of 1:3 and 1:5 mixtures of three different cements with two types of sand have been determined. The relation of tensile to bending strength is best in cement of low binding power, whereas the relation of tensile to compression strength is best with cement of high binding power. The use of carefully graded sand in making cement mortars has a more beneficial effect when low-grade cement is used ; high-grade cement gives a good mortar with most types of sand. The effect of varying the quantity of water and of different shapes of test piece on the values of the various strengths has also been determined. A. R. POWELL.

Determination of free calcium hydroxide in set cements. Calorimetric method. G. E. Bessey (Dept. Sci. Ind. Res., Building Res. Tech. Paper 9, 1930, 25 pp.).-The determination of free calcium hydroxide is dependent on the difference in the heat of hydration of the material when heated to 350° and 550°. Preliminary tests proved that no sulphates were decomposed below 1000° nor carbonates below 550°, the loss at 350-500° being due only to the dissociation of calcium hydroxide. About 10 g. (W) of cement passing 100-mesh are heated in an electric furnace; cooled, and sealed in a tube, which is broken in a calorimeter after stable conditions have been attained. Duplicate determinations of the heat evolved by material heated to 350° (Q₁) and 550° (Q₂) permit the computation of free CaO from the formula: $(Q_2/W_2 - Q_1/W_1)100fk/273$, in which f is a factor for incomplete decomposition of Ca(OH)₂ at 530° and any adsorption of carbon dioxide, and k a factor involving the combination of calcium oxide with any other materials during ignition. The three correction factors may be condensed to 0.41 C. A. KING. when applied to Portland cement.

Mixer. ZAKARIAS.-See I.

See also A., Aug., 1010, Decomposition of aluminous silicates for analysis (FINN and KLEKOTKA).

PATENTS.

Rotary kilns. E. G. STONE (B.P. 332,761, 6.8.29).-A kiln for producing cement consists of two or more separate rotary-kiln sections arranged in series. All except the final section are divided into smaller tubes and the last section is mounted to tilt longitudinally. The first or slurry section is rotated at greater speed than are other sections. C. A. KING.

Manufacture of pavement materials. NAAML. VENN. KONINKLIJKE STEARINE KAARSENFABRIEK GOUDA cast iron. A. LE THOMAS (Rev. Mét., 1930, 27, 256-(B.P. 333,433, 27.9.29. Holl., 4.2.29).-Increased adhesion is secured if broken road material is coated first with molten bitumen or a bitumen mixture and then with a bitumen emulsion. Coagulation of the emulsion is regulated by adding cement or other suitable filler.

C. A. KING.

Hardening of alberene stone. P. MAHLER, Assr. to ALBERENE STONE CO. (U.S.P. 1,738,956, 10.12.29. Appl., 26.2.27) .- Any natural stone containing one or more groups of silicates, e.g., soapstone, is hardened

by subjecting it, under controlled conditions as to time and temperature, to successively increasing temperatures, in order to drive off the water of constitution of the different silicate groups. F. SALT.

Dental cement. O. SIMON (B.P. 333,325, 27.5.29).— The hardness and density of silicate or zinc phosphate cements are increased by adding an insoluble material, e.g., wax or bitumen, together with acid or salts of aluminium, calcium, magnesium, strontium, or beryllium. The wax or oil may first be treated with an acid and the excess afterwards neutralised, and an organic solvent may be used to facilitate mixing.

C. A. KING. Wood veneer and its preparation. W. H. Wood (U.S.P. 1,738,132, 3.12.29. Appl., 7.4.24. Renewed 26.7.28) .- To facilitate the transport and storage of thin wood veneer and to maintain its pliable nature etc., it is impregnated with a water-soluble sulphate, which forms crystals containing water of crystallisation, preferably by soaking it in a hot, concentrated solution of magnesium sulphate. F. SALT.

Manufacture of [sand-faced] building bricks and similar clay or like products. C. S. JILLINGS (B.P. 333,346, 25.6.29).

Drying kilns [for lumber etc.]. B. F. STURTEVANT Co., Assees. of H. F. HAGEN (B.P. 333,566, 14.2.29. U.S., 1.10.28).

[Photographically] imitating [the grain in] marble or the like. MASA GES.M.B.H. ZUR HERSTELLUNG künstl. Oberflächen (B.P. 313,007, 4.6.29. Ger., 4.6.28).

[Photographic] production of printing plates in imitation of the fibre in wood. MASA GES.M.B.H. ZUR HERSTELLUNG KÜNSTL. OBERFLÄCHEN (B.P. 310,897, 2.5.29. Ger., 2.5.28).

Concrete mixer. CHAIN BELT Co. (B.P. 333,138, 13.1.30. U.S., 11.1.29).

Rotary concrete and the like mixing machines. Fils de J. Weitz (B.P. 333,492, 6.1.30. Fr., 16.2.29).

Manufacture of sheets [e.g., wall-board] from plastic material. A. E. WHITE. From UPSON Co. (B.P. 333,161, 3.4.29).

Drying or like treatment of timber and other materials. C. GOODALL (B.P. 333,403, 20.8.29).

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

Rotary cylindrical furnace for melting foundry 264) .- A 5-ton rotary cylindrical furnace for melting cast iron by means of a powdered-fuel flame injected at one end of the longitudinal axis is described. It comprises a riveted steel plate shell lined with a silicious refractory 20 in. thick, which will withstand 120-150 fusions. For high-temperature fusions the furnace is provided with a preheater for the air, by the use of which temperatures up to 1650° are readily obtained. This type of furnace has the advantage over the cupola type that there is only a very small oxidation of the

iron, and the composition of the cast metal may therefore be more accurately regulated. The fuel consumption averages 16—18% of the weight of molten metal obtained. A. R. POWELL.

Value of an iron ore or other material added to the blast furnace as a function of the yield of cast iron. J. VALLET (Rev. Mét., 1930, 27, 248-255).-Expressions are derived for determining the market value of iron ore based on its composition and the yield of cast iron obtained from it; the effect of the nature and composition of the coke on the results is discussed.

A. R. POWELL.

Change in composition of the cementite constituent during the recovery of special steels. A. PORTEVIN and P. CHEVENARD (Compt. rend., 1930, 191, 408-411; cf. B., 1925, 504).-The authors' method of dilatometric analysis has been applied during the recovery of a steel containing 1.5% C and 2% Mn (previously rendered austenitic by water-tempering at 1180°) heated at the rate of $250^{\circ}/hr$. to t° (100-700°) and maintained at t° for 7 hrs. Curves in which t is plotted against dilatability, total expansion due to the thermal cycle, gain in hardness, resistivity, remanent magnetisation (field 900 gauss), and coercive field show the changes in concentration and proportion of the phases cementite, α - and γ -solid solutions. Below 200° a carbide (Curie point 120°) is precipitated, the iron returning from the γ - to the α -state at 200-225° with precipitation of another carbide (Curie point 170°). Above 260° the transformation austenite \rightarrow martensite-carbide aggregate occurs, the proportion of carbide becoming progressively smaller as t rises. At 400° the steel is completely in the form of sorbite, and at higher temperatures the carbide precipitated by heating becomes richer in manganese at the expense of the ferrite. J. GRANT.

Absorption of sulphur and phosphorus by iron and steel in welding with impure acetylene. ANON. (Jahresber. VII., Chem.-Tech. Reichsanst., 1928, 83— 86).—The amounts of sulphur and phosphorus entering the metal are small and without effect. Chemical purification of the acetylene is unnecessary.

A. A. ELDRIDGE.

Sulphur in cast iron. H. H. EBERT (Zentral-Europ. Giesserei-Ztg., 1930, 3, 3–4; Chem. Zentr., 1930, i, 1997).—Methods of desulphurisation are discussed. A. A. ELDRIDGE.

Effect of the state of the cementite on the heat sensitivity, the tendency to core-hardening, and formation of hardness fractures in carbon steels. S. STEINBERG (Stahl u. Eisen, 1930, 50, 1164—1166). —The effect of various heat treatments on the microstructure and mechanical properties of steels with 0.8 and 1.3% C has been investigated. The hypoeutectoidal steel after annealing at 950° and slow cooling becomes hard and tough after hardening at 735° and quenching, but hardening at 750—800° produces a more coarsely crystalline structure and the metal becomes brittle with a tendency to the development of hair-cracks. The hypereutectoidal steel requires very slow cooling after annealing at 950° and a hardening temperature of 800—850° to produce a tough structure. Lamellar cementite causes brittleness and hair-cracks to develop on hardening, whereas granular cementite or troostite imparts a high degree of toughness to steel.

A. R. POWELL.

Effect of small additions of copper or nickel on the thermal expansion and growth of cast iron. O. BAUER and H. SIEGLERSCHMIDT (Mitt. Materialprüf., 1930, 110—111).—Cast iron containing $3 \cdot 15\%$ C, $1 \cdot 12\%$ Si, and $0 \cdot 114\%$ S had a coefficient of thermal expansion of $0 \cdot 0000141$, and after twice heating to 750° it showed a permanent elongation of $0 \cdot 201\%$ due to carbide decomposition. Addition of $0 \cdot 55\%$ Cu or $0 \cdot 48\%$ Ni had no effect on the thermal expansion, but reduced the permanent elongation to $0 \cdot 155\%$ and $0 \cdot 153\%$ respectively. A. R. POWELL.

New methods in the study of corrosion and protection of metallurgical products against corrosion. J. COURNOT (Bull. Soc. chim., 1930, [iv], 47, 802-825).—Theories of corrosion and the experimental methods of investigation available are reviewed. A résumé is given of methods of protection of metals from corrosion, especially by coating with other metals or with paints, and by anodic treatment. E. S. HEDGES.

Matte smelting of oxidised copper ores in reverberatories. ST.-MAURICE (Rev. Mét., 1930, 27, 214– 222).—Notes on the method of calculating the charge for matte smelting of silicious oxidised copper ore relatively low in iron and high in manganese are given. The ore is smelted with gypsum and coke mixed with a small amount of crude petroleum to prevent loss by dusting. The amount of gypsum added is sufficient to produce a matte containing more than 50% Cu, and the quantity of coke is adjusted to reduce ferric and manganic oxides to the ferrous and manganous states and the gypsum to calcium sulphide. The slags obtained average 0.2-0.3% Cu and have a very low iron content. A. R. POWELL.

Copper alloy systems with an α -phase having variable limits and their use for the hardening of copper. M. G. Corson (Rev. Mét., 1930, 27, 83-101, 133-153, 194-213, 265-281).-An account is given of the researches leading up to the development of the so-called "Corson alloys" which have been the subject of numerous patents in recent years. The alloys consist of copper with small percentages of chromium, cobalt, silicon, or silicides of nickel, cobalt, iron, or chromium, all of which constituents have a higher solid solubility at high temperatures than at the ordinary temperature. Between 20° and 1000° the solid solubility of chromium in copper varies from 0.05 to 0.8%, of cobalt from 0.35 to 3.4%, of Co₂Si from 0.3 to 3.3%, of Ni₂Si from 0.7 to 8.2%, of iron from 0.2 to 3.8%, and of silicon from 2.8 to 7.5%. Alloys containing silicides are best hardened by quenching from 800-1000° and ageing at 250-450°; these alloys should contain a slight excess of the second metal over that required to form its silicide so as to ensure maximum hardening on ageing without the serious fall in electrical conductivity which is produced by the retention of silicon in solid solution. Photomicrographs of numerous alloys of this type are reproduced, and the effect of heat treatment on the

Manager and the second second second

mechanical and electrical properties and on the structure is illustrated by graphs and photographs.

A. R. POWELL.

Cyanidation of cupriferous gold ores. W. G. CLARKE and B. H. MOORE (Chem. Eng. Min. Rev., 1930, 22, 353-355).-Gold ores containing copper and other carbonates cannot be efficiently cyanided in the usual way owing to the high cyanide consumption, and an acid leach is impracticable owing to the presence of calcium and magnesium carbonates. Good extraction of gold from an Australian ore of this type has been obtained by roasting at 600° for $1\frac{1}{2}$ hrs., grinding the product finely, passing it over amalgamating plates to remove coarse gold, and cyaniding the tailings with 0.07% cyanide solution for 7 hrs. with the addition of 1 lb. of lime per ton of ore. Very little copper is dissolved in this period and the cyanide consumption is only 13 lb. per ton of ore. A. R. POWELL.

Rationalisation of the shaft furnace for treatment of lead mineral. N. C. KYRIACOU (Rev. Mét., 1930, 27, 113—124).—The theory of the reactions which take place in the lead blast furnace is outlined and some modern types of such furnaces are described with reference to constructional diagrams. A. R. POWELL.

Sprayed molten metal coating process and results. R. L. BINDER (J. Franklin Inst., 1930, 211, 173-217).—The development of the sprayed metal process is described in which wire is fed uniformly into an acetylene-oxygen flame and the metal blown by means of compressed air on to a receiving surface.

C. A. KING.

Detinning of scrap tinplate. W. W. Scorr and N. E. DAVIS (Ind. Eng. Chem., 1930, 22, 910-911).— A laboratory trial of the recovery of tin from scrap tinplate by agitation with dilute tartaric acid in contact with air is reported. The scrap tin was placed in a rotating cylinder partly immersed in the acid. The stannous tartrate was precipitated with hydrogen sulphide, and the loss of tartaric acid was 10% by wt. of the tin recovered. Tins require pretreatment to free them from grease and lacquer. C. IRWIN.

Heat radiation of thermit. W. SHOULEJKIN and X. SOLOVOVA (Z. physikal. Chem., 1930, 149, 434– 438).—By means of a solarimeter the heat radiation from burning thermit mixtures has been measured. With ordinary iron-thermit the maximal effect amounts to 38 kw., and with manganese dioxide and potassium permanganate the values are, respectively, 256 and 2080 kw. E. S. HEDGES.

Actual state of the metallurgy of electrolytic zinc according to recent publications. A. SANSON (Rev. Mét., 1930, 27, 57-63, 125-132).—A review of modern practice in three American electrolytic zinc works, viz., those at Great Falls, Anaconda, and Kellogg (Idaho). In each case the process is briefly described with reference to flow sheets and the electrical conditions in the cells are discussed at some length.

A. R. POWELL.

Determination of cadmium and copper in spelter and zinc ores by rapid internal electrolysis. E. M. COLLIN (Analyst, 1930, 55, 495-501).—Zinc and cadmium may be quantitatively separated by the internal electrolysis method as used for the separation of bismuth and lead (cf. Sand, B., 1930, 773), employing zinc anodes and tinned copper wire with platinum foil soldered to one end for connecting to the cathode. For spelter a sample (10 g.) is attacked with cold 10% sulphuric acid, the residue from which is collected and dissolved in 20% nitric acid, any tin present being filtered off. The filtrate is evaporated to fuming with 20% sulphuric acid, the nitric acid being thus removed and any lead precipitated. The filtrate from the lead is combined with the original solution and 10-vol. hydrogen peroxide and excess of ammonia $(d \ 0.880)$ are added. The iron precipitate, after boiling, may be ignited and weighed as oxide or determined by means of permanganate. The remaining solution is neutralised with sulphuric acid, a slight excess of acid added, and the solution electrolysed for copper at 70°. The deposit is weighed and, after adjusting for acidity, the solution is electrolysed for cadmium. Antimony does not interfere under the conditions of experiment. The treatment of ores and residues differs only in the initial attack. D. G. HEWER.

Cast-iron enamels. ANDREWS.-See VIII.

See also A., Aug., 987, Structure of copper-zinc alloys. (BRONIEWSKI and STRASBURGER). Age-hardening lead-calcium alloys (SCHUMACHER and BOUTON). 988, System iron-silicon (STOUGHTON and GREINER). System iron-vanadium (ÔYA). Formation of the violet copper alloy Cu₂Sb (ARRIVAUT). Silicon-aluminium alloys (GUILLET and BALLAY). 999, Passivity curves of some iron alloys (BAN-NISTER and EVANS). 1002, Reduction of metal oxides by hydrogen (TAYLOR and STARKWEATHER). 1004, Electro-deposition of beryllium (BOOTH and TORREY). 1011, Electrotitrimetric determination of zinc in a mineral (JOASSART and LECLERC).

PATENTS.

Metallurgical furnaces. W. ALBERTS (B.P. 332,850, 6.11.29. Ger., 4.7.29).—In order to increase the cooling surface of the arch of a furnace, profile bricks are arranged so as to give a wave-like surface in contact with the air, with alternating ridges and depressions.

C. A. KING.

Cupola furnaces. J. E. FLETCHER, and BRIT. CAST IRON RES. Assoc. (B.P. 333,322, 24.5.29).—In a cupola surrounded by a wind chest from which the main and supplementary tuyères enter the cupola at different heights, a hollow spherical valve can be operated from outside the wind chest to regulate the supply of air through the main tuyère. C. A. KING.

Crucible furnace. J. W. PENICUD (B.P. 332,701, 17.6.29).—The refractory lining of the furnace is composed of superposed rings having only horizontal joints, and surmounted by a dome-shaped top with plugged holes for admitting fuel. The internal crucible is covered by a truncated cone and the lip may extend through the furnace lining. Suitable means for cokeor oil-heating are provided. C. A. KING,

Gas-fired metal-heating furnaces. VEREIN. STAHLWERKE A.-G., and E. SCHREIBER (B.P. 318,552, 4.9.29. Ger., 5.9.28).—In annealing furnaces, the heating gas is mixed with the required quantity of air for complete combustion before discharge from the port, and additional gas to produce a reducing atmosphere is admitted around the main heating ports.

C. A. KING.

Protective devices or alarms for metal-melting furnaces. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of J. L. MCFARLAND (B.P. 315,841, 19.7.29. U.S., 19.7.28).—In melting furnaces of the crucible type, the crucible is enclosed in a receiver to hold escaping metal, which makes electrical contact between the ends of two conductors encased in refractory material, thus causing a signal to be given. C. A. KING.

Reduction of iron ores. A. LANGER (B.P. 309,998, 8.4.29. Austr., 19.4.28).—The charge of ore and reducing agent is fed on to the surface of a flowing bath of molten iron and caused by the action of a series of blast burners to flow in the opposite direction to the stream of iron. Part of the iron issuing from one end of the furnace is returned, with or without the addition of carbon, to the other end to accelerate the flow of metal through the furnace. A. R. POWELL.

Manufacture of steel. E. C. SMITH, ASST. to CENTRAL ALLOY STEEL CORP. (U.S.P. 1,744,418, 21.1.30. Appl., 16.2.25).—The steel is deoxidised with manganese, silicon, and aluminium, and occluded slag is caused to coalesce and rise to the surface by the addition per ton of steel in the ladle of 0.5 lb. of a flux consisting of 8 pts. of litharge and 1 pt. of sodium fluoride. A. R. POWELL.

Purification of steel. (SIR) G. C. MARKS. From LUSIFER PRODUCTS CO. (B.P. 332,890, 21.1.29).—After the completion of the usual finishing reactions and preferably after removal of the greater part of the final slag there is added to the molten steel less than 1% of a finely-divided mixture containing 50—98% Al_2O_3 , 20—1% Fe₂O₃, 30—1% SiO₂, and 0—4% TiO₂, *e.g.*, crude bauxite, alundum, or emery. This treatment serves to remove non-metallic impurities and occluded gases from the steel. A. R. POWELL.

Production of iron and steel castings. J. E. FLETCHER (B.P. 333,494,10.1.30).—The mould is preheated to such a temperature that in the subsequent heating of the mould by the molten metal the parts of the former in contact with the metal are just heated to the recalescence temperature when the metal in contact with them has itself cooled to the same point. Internal stress during cooling is thus avoided. A. R. POWELL.

Casting of ingots. (HON. SIR) C. A. PARSONS and H. M. DUNCAN (B.P. 332,654, 3.5.29. Addn. to B.P. 278,032; B., 1927, 912).—Heat is applied to the peripheral portion of the surface of the ingot to maintain horizontal isothermals and uniform segregation. Such heating may be by means of hot gases through tangential openings, or by electrical means. C. A. KING.

Production of articles made of steel or cast iron and resistant to attack by corroding agents. P. F. M. AUBERT, and A. J. P. and H. A. M. DUVAL (AUBERT & DUVAL FRÈRES) (B.P. 304,783, 14.2.30).— The articles consist of steel or cast iron containing one or more of the metals aluminium, silicon, manganese, nickel, chromium, molybdenum, tungsten, vanadium, titanium, zirconium ; they are rendered resistant to corrosion by nitrogenisation at 500° in ammonia for 4-8 hrs. A. R. POWELL.

Rendering austenitic nickel-chromium steels non-corrodible. W. H. HATFIELD and H. GREEN (B.P. 333,237, 5.2.29).—An austenitic steel containing 10-25% Cr and 25-5% Ni, with or without other alloying elements, is tempered at $100-400^{\circ}$ after fashioning into suitable shape and polishing. Thus a steel containing 0.14% C, 8% Ni, and 18% Cr becomes resistant to tarnishing by organic acids after tempering at 200° and slowly cooling. A. R. POWELL.

Manufacture of cast iron and steel containing copper. F. HEUSLER (B.P. 317,734, 20.8.29. Ger., 20.8.28).—The copper is added to the molten metal in the form of a manganese-copper, silicon-copper, or manganese-silicon-copper alloy just prior to casting. Up to 3% Cu may thus be introduced into mild steel without segregation occurring. A. R. POWELL.

Steel alloy and its treatment. C. P. BEATH and B. J. BABBITT, Assrs. to WESTERN ELECTRIC Co., INC. (U.S.P. 1,743,309, 14.1.30. Appl., 19.11.27).—The steel contains 5—50% Co, 1—12% W, 0—7% Mn, 0·3— 5% C, 6—18% Ni, and 0—12% Cr, the preferred composition being 20% Co, 9% W, 2·5% Mn, 0·8% C, 7% Ni, and 60.7% Fe. After heating at 820—830° for 2—3 hrs. and quenching in oil or water, the alloy has a high coercive force and magnetic remanence.

A. R. POWELL.

Magnetic [nickel-iron alloy] material. A. F. BANDUR, ASST. to WESTERN ELECTRIC Co., INC. (U.S.P. 1,743,089, 14.1.30. Appl., 26.4.28).—An alloy of iron with 30—60% Ni, preferably 35—38%, is rolled into thin strips which are oxidised by heating in oxygen at above 400° and rolled into a ring core, which is heated at 480° for 15 min., whereby an almost constant permeability over a wide range of flux densities is obtained. A. R. POWELL.

Constructional steel. F. KRUPP A.-G. (B.P. 319,319, 15.8.29. Ger., 20.9.28).—The steel contains up to 0.4% C, up to 0.5% Si, 1.2-2% Mn, and 0.4-0.8% Cu; the preferred composition is 0.2% C, 0.35% Si, 1.6% Mn, and 0.45% Cu. A. R. POWELL.

Surface plating of metals [e.g., iron or steel] with [chromium] alloys. RESEARCH CORP., Assees. of M. FIEDLER (B.P. 310,812, 30.4.29. U.S., 30.4.28).— The metal is plated with nickel or cobalt, then with chromium, and heated by means of a high-frequency induction coil in such a way that only the plated skin is heated to a sufficiently high temperature to cause the plating metal or metals to alloy with the surface of the ferrous metal. The process may also be used for coating iron with zinc-copper alloys. [Stat. ref.]

A. R. POWELL.

Bright annealing of metals. METALLGES. A.-G., H. VON FORSTER, and E. LAY (B.P. 332,656, 3.5.29).— The apparatus comprises a furnace chamber provided with means for passing a non-oxidising gas therethrough and a stuffing box in the lid carrying a vertically acting, movable rod terminating in a bottom plate which carries the charge, e.g., coils of wire, and closes the discharge outlet. When the annealing operation is finished, a cooling box is wheeled below this outlet, around which it fits tightly, and the charge is lowered into the box by means of the rod so that it can be cooled in a nonoxidising atmosphere. A. R. POWELL.

Welding of copper. W. ANDREWS, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 332,894, 29.1.29, and 333,466, 2.11.29).—(A) Copper for making welded articles contains 0.03-0.05% P or 0.05-0.1% Si, B, or Cd; it is welded by using a copper rod containing silver and coated with a flux of 45% NaNH₄HPO₄, 35-45% Na₂B₄O₇, up to 10% H₃BO₃, 6%Mg₂SiO₄, 3% PbO, and 1% LiF. (B) The welding rod consists of an alloy of copper with 0.5% Ag and 0.06% P, coated with a mixture of 1 pt. of fluorspar and 3 pts. of a deoxidiser alloy containing 15% Mg, 30%Mn, 50% Si, and 5% Fe, C, and other impurities. Alternatively, the silver may be plated on to the phosphorcopper rod and the rod then coated with a mixture of 3 pts. of 80% ferrosilicon, 2 pts. of 15% phosphorcopper, and 1 pt. of a 1: 1 mixture of lime and felspar.

A. R. POWELL.

Production of scale-free welded tubing. AIR REDUCTION Co., INC. (B.P. 332,869, 29.11.29. U.S., 10.12.28).—The formed tubing is heated and the seam welded progressively while at the same time reducing gas is passed through the tube. C. A. KING.

Production of bronze. G. BÄRTGES (B.P. 333,442, 2.10.29).—A bronze resistant to corrosion by sulphuric, phosphoric, and organic acids consists of copper with 7-13% Al and 2-6% Fe. The metals are melted under an alkaline borate flux and a small quantity of sodium, potassium, or magnesium is added as a deoxidiser. The alloy is cast, allowed to cool, remelted under the same slag, deoxidised again with a small quantity of magnesium, and cast at 950–1000° in moulds which admit of rapid cooling. A. R. POWELL.

[Copper] alloy wire. W. H. BASSETT, ASST. to AMER. BRASS CO. (U.S.P. 1,744,717, 28.1.30. Appl., 18.6.28).—A strong alloy for lead-in wires for telephone installations consists of copper with 0.5 - 1.5% Cd and 2—7% Zn; its conductivity is 55% of that of copper and in the hard-drawn state it has a tensile strength of 54 tons/in.² A. R. POWELL.

Bearing alloy [with a lead base]. J. V. O. PALM and E. C. KNUTH, Assrs. to CLEVELAND GRAPHITE BRONZE Co. (U.S.P. 1,745,314, 28.1.30).—The alloy comprises 67% Pb, 15—18% Cd, 5—10% Zn, and 6—15% Sb, preferably 67% Pb, 18% Cd, 5% Zn, and 10% Sb.

A. R. POWELL.

Melting of oxidisable material [brass]. HIRSCH KUPFER- U. MESSINGWERKE A.-G. (B.P. 313,856, 17.6.29. Ger., 16.6.28).—The apparatus comprises a melting crucible surrounded by an induction coil and surmounted by a conical chamber for holding the charge. Above this chamber is a preheating chamber with a bottom perforated plate, closed by a sliding door beneath which is a funnel communicating with the conical chamber. The first charge is melted with the door closed, the door is then opened to allow the vapours from the charge to preheat a second charge in the top chamber, the molten metal is tapped from a taphole in the bottom of the crucible, and the preheated charge then allowed to fall through the vapours into the crucible, thus avoiding oxidation. [Stat. ref.] A. R. POWELL.

Light-metal [magnesium] alloy. J. A. GANN, Assr. to Dow CHEM. Co. (U.S.P. 1,743,849, 14.1.30. Appl., 26.7.26).—The alloy consists of more than 80% Mg, 1—10% Al, 1—5% Cu, 0.5—4% Cd, 0.1—1% Zn, and 0.1—1% Mn, the preferred composition being 88% Mg, 8.25% Al, 2% Cu, 1% Cd, 0.5% Zn, and 0.25% Mn. A. R. POWELL.

Removal of gases from molten light metals such as aluminium and its alloys. VEREIN. ALUMINIUM-WERKE A.-G. (B.P. 313,489, 21.5.29. Ger., 12.6.28).— An electrical heating unit is situated above molten metal in a melting chamber to maintain its temperature, and the gases above the metal are circulated in a conduit by mechanical means. C. A. KING.

Treating aluminium with halogen gases. R. J. ANDERSON, ASST. to FAIRMONT MANUF. Co. (U.S.P. 1,743,515, 14.1.30. Appl., 1.5.28).—Carbides, nitrides, and oxides, as well as occluded gases, may be removed from molten aluminium by treating it with a stream of, *e.g.*, chlorine. A. R. POWELL.

Flotation process for oxide ores [cassiterite]. J. E. BARNITZKE (B.P. 311,239, 7.5.29. Ger., 7.5.28).— The ore pulp, before or after addition of the flotation oils, is treated with hydrogen, or a gas mixture containing hydrogen, at the ordinary or at an elevated temperature, whereby superficial reduction of the tin oxide particles to metal is stated to take place so that they readily become wetted by the oils. A. R. POWELL.

[Lead] alloys [for packing joints]. F. W. ANDREWS, ASST. to FRIGIDAIRE CORP. (U.S.P. 1,743,303, 14.1.30. Appl., 28.4.27).—The alloy, which has a coefficient of thermal expansion nearly equal to that of cast iron, comprises 90—96% Pb, 3—1% Sn, and 4—2% Bi. A. R. POWELL.

Electrolytic deposition of gold and silver. A. MOZER (B.P. 333,462, 30.10.29. Ger., 11.12.28).—The metals are deposited with 0.1—0.3 volt at a current density of 100 amp./m.² from solutions of the iodide in potassium iodide solution, e.g., gold from a bath containing 21 g. of aurous iodide and 140 g. of potassium iodide per litre, and silver from a bath containing 40 g. of silver iodide and 370 g. of potassium iodide per litre.

A. R. POWELL.

ЬЬ

Manufacture of magnetic alloys. V. B. BROWNE (Re-issue 17,771, 12.8.30, of U.S.P. 1,570,229, 19.1.26).— See B., 1926, 282.

Magnetic alloy. B. FETKENHEUER and H. NEU-MANN, ASSTS. to SIEMENS & HALSKE A.-G. (U.S.P. 1,772,771, 12.8.30. Appl., 7.5.28. Ger., 20.5.27).— See B.P. 290,658; B., 1929, 1019.

Pickling of metals. E. CHAPMAN and A. HILL, Assrs. to IMPERIAL CHEM. INDUSTRIES, LTD. (U.S.P. 1,773,024, 12.8.30. Appl., 12.4.29. U.K., 14.4.28).— See B.P. 309,314; B., 1929, 523. Preparation of homogeneous alloys of lead [with sodium]. G. KRÄNZLEIN, R. K. MÜLLER, F. BRUNN-TRÄGER, and H. JANZ, ASSTS. to I. G. FARBENIND, A.-G. (U.S.P. 1,774,384, 26.8.30. Appl., 24.10.28. Ger., 5.11.27).—See B.P. 300,129; B., 1929, 1019.

Manufacture of soldering pastes. G. Клотн (U.S.P. 1,772,952, 12.8.30. Appl., 29.3.29. Ger., 3.4.28).—See B.P. 309,029; B., 1930, 199.

[Electrolytic] production of aluminium and its alloys. T. R. HAGLUND, Assr. to INTERNAT. PATENT CORP. (U.S.P. 1,772,937, 12.8.30. Appl., 19.10.25. Swed., 15.11.24).—See B.P. 242,958; B., 1926, 754.

Electrolytic deposition of gold. W. F. GRUPE (B.P. 333,246, 3.5.29).—See U.S.P. 1,731,415; B., 1930, 20.

Ore carrier for circular Dwight-Lloyd type blast-roasting apparatus. "BERZELIUS" METALL-HÜTTEN GES.M.B.H. (B.P. 333,461, 28.10.29, Ger., 27.3.29).

Water-cooled blowing tuyères for blast furnaces. F. D. BROWN, G. B. RICHARDS, and T. J. ROBERTS (B.P. 333,095, 1.10.29).

[Air-vibrator] means for producing an intermittent supply of air to blast, smelting, and like furnaces. E. HICKMAN (Y EMPARAN) (B.P. 311,269, 10.4.29. Spain, 8.5.28).

Sectional electroplating, particularly applicable for plating large objects with chromium. SIEMENS & HALSKE A.-G., Assees. of K. W. SCHWARTZ (B.P. 314,392, 25.6.29. U.S., 26.6.28).

Washing waste blast-furnace gases (B.P. 333,317). —See I.

XI.—ELECTROTECHNICS.

Utilisation of waste steam. REUTER.—See I. Corundum and silicon carbide. SCHNEIDLER.—See VIII. Electrolytic zinc. SANSON. Electrolysis of spelter and zinc ores. Collin.—See X. Rubber insulating compounds. WIEGAND and BOGGS.—See XIV. Treatment of boiler waters. BARTOW.— See XXIII.

See also A., Aug., 973, Rôle of the core metal in oxide-coated filaments (LOWRY). 994, Water-gas equilibrium and the electric discharge (PETERS and KÜSTER). 1003, Synthesis of ozone (BREWER and WESTHAVER). 1004, Electrodeposition of beryllium (BOOTH and TORREY). 1011, Electrotitrimetric determination of zinc in a mineral (JOASSART and LECLERC).

PATENTS.

Electric-discharge devices. A. A. J. CROWNE (B.P. 332,734, 4.7.29).—A hot or cold radioactive cathode is surrounded by or plated with photoelectric material which emits electrons under the incidence of X-, γ -, or α -rays, and is enclosed in a vessel containing, if desired, gases which reduce the impedance of the device. [Stat. ref.] J. S. G. THOMAS.

Cathodes for electric-discharge tubes. M.-O. VALVE CO., LTD., and D. A. RANKIN (B.P. 332,695, 12.6.29).—A tungsten core coated with zinc oxide is subjected to the action of barium vapour in the tube, whereby a coating of barium oxide is produced. J. S. G. THOMAS.

Luminous electric-discharge tubes. G. CLAUDE (B.P. 318,198, 27.6.29. Fr., 30.8.28).—The filling for such tubes consists of helium with less than 5% of neon. J. S. G. THOMAS.

Photo-electric cells. G. B. ELLIS. From Soc. DES USINES CHIM. RHÔNE-POULENC (B.P. 332,733, 12.7.29).—The photo-electric current is increased by the emission of secondary electrons from the surface of a third electrode arranged inside the cell and raised to a suitable voltage. J. S. G. THOMAS.

[Positive electrodes for alkaline] electric accumulators. O. Y. IMRAY. From I. G. FARBENIND. A.-G. (B.P. 332,884, 13.1.30, Ger., 5.2.29. Addn. to B.P. 325,581; B., 1930, 428).—The active mass, moistened, if desired, with glycerin, and mixed with graphite freed from impurities, more especially iron, is compressed, in order to increase the capacity of the electrodes.

J. S. G. THOMAS.

Producing and maintaining constant the necessary supply of phosphoric acid in the electrolyte of lead accumulators. M. KUGEL (B.P. 332,660, 3,5.29. Addn. to B.P. 280,197; B., 1928, 864).—Pieces of glassy metaphosphoric acid of definite weight are added to the electrolyte. Alternatively a mixture of phosphates of metals which do not harm the accumulator may be added. J. S. G. THOMAS.

Electrolytic condenser. E. W. ENGLE and H. L. OLESEN, ASSTS, to FANSTEEL PRODUCTS Co., INC. (U.S.P. 1,744,302, 21.1.30. Appl., 14.3.27).—The condenser comprises an acid-proof container filled with a compact roll of tantalum and molybdenum or tungsten sheets separated by thin sheets of asbestos moistened with dilute sulphuric acid. A. R. POWELL.

Moistening of gases prior to purification by electrostatic deposition of dust. SIEMENS-SCHUCKERT-WERKE A.-G. (B.P. 333,048, 29.7.29. Ger., 1.6.29).— Steam, produced by injecting a liquid, *e.g.*, water, into the products of combustion of a gas burning in a container, is passed into the gas to be treated.

J. S. G. THOMAS.

Manufacture of electric insulating materials. W. S. SMITH, H. J. GARNETT, and J. N. DEAN (B.P. 333,290, 10.5.29).-Rubber, gutta-percha, balata, and similar materials are treated with urea or thiourea or derivatives of these, with the additional presence of proteolytic enzymes such as pepsin or trypsin, if desired. The rubber or other material may be treated as latex or in the ordinary form, using an aqueous solution of the urea compound. The rubber or other material after such treatment and subsequent washing contains a reduced proportion of protein and can be used advantageously for insulating submarine cables, preferably after hardening by admixture with purified gutta-percha or balata or with a bitumen of high m.p. and low content of mineral matter and of free carbon. D. F. Twiss.

Manufacture of electrically insulating material. INTERNAT. GEN. ELECTRIC CO., INC., Assees. of ALLGEM. ELEKTRICITÄTS-GES. (B.P. 308,315, 21.3.29, and 309,507, 11.4.29. Ger., [A] 21.3.28, [B] 11.4.28).—(A) Powdered metal, e.g., lead or zinc, each grain being coated with a solid coating of material of smaller conductivity, e.g., lacquer or resin, is compressed so that air gaps are removed. (B) In the manufacture of insulating material composed of alternate superposed layers of different electrical conductivities, films of lacquer, baked at 200—250°, are united with a web of fibrous material, e.g., fabric, by a binder, e.g., lacquer.

J. S. G. THOMAS.

Manufacture of insulated cables. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 332,891, 24.1.29).— Metallic conductors, covered with a non-distillable polymerisation production of butadiene, mixed, if desired, with india-rubber or similar vegetable rubber, together with a filler, *e.g.*, lampblack, and sulphur, and, if desired, a vulcanisation accelerator, and/or an antiager, are vulcanised at 100—150°. J. S. G. THOMAS.

Arc-welding electrode. B. TURNER, Assr. to FERRO-ARC WELDING CO., LTD. (U.S.P. 1,773,653, 19.8.30. Appl., 19.6.28. U.K., 26.8.27).—See B.P. 295,514; B., 1928, 760.

[Electrolytic] means for indicating the presence of saline, alkaline, acid, or other impurities in water and other fluids. W. C. CROCKATT (U.S.P. 1,774,319, 26.8.30. Appl., 10.11.26. U.K., 16.11.25). —See B.P. 266,047; B., 1927, 303.

Electric furnaces [with removable heating units]. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of C. L. IPSEN and A. N. OTIS (B.P. 333,457, 21.10.29. U.S., 23.10.28).

Electric heating units [for bakers' ovens etc.]. A.-G. KUMMLER & MATTER (B.P. 313,056, 5.6.29. Switz., 5.6.28).

Heat fuses for use with electric and other furnaces. BIRMINGHAM ELECTRIC FURNACES, LTD., and A. G. LOBLEY (B.P. 333,199, 25.4.29).

Regulating the electrodes in tilting furnaces. W. W. TRIGGS. From FLODINJERN AKTIEBOLAG (B.P. 333,318, 21.5.29).

Magnetic separators. O. C. JONES (B.P. 333,042, 24.7.29).

Manufacture of electrical resistances. I. SILBER-STEIN (B.P. 333,837, 27.11.29. Ger., 18.12.28).

[Laminated] magnetic cores. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of J. J. FRANK (B.P. 317,830, 23.8.29. U.S., 23.8.28).

Selenium [light-sensitive] cells. W. PRIOR and C. CRISP (B.P. 333,293, 11.5.29).

Light-sensitive apparatus. BRIT. THOMSON-HOU-STON CO., LTD., Assees. of T. A. EDISON (B.P. 316,940, 1.8.29. U.S., 6.8.28).

Light-sensitive devices. [Photo-electric cells.] Westinghouse Electric & Manuf. Co., Assees. of V. K. Zworykin (B.P. 333,116, 6.11.29. U.S., 6.11.28).

Photo-electric cells. G. W. WALTON (B.P. 333,548, 14.2.29).

Electron-discharge devices. LOEWE-RADIO GES. M.B.H., and E. RÖMHILD (B.P. 308,978, 2.4.29. Ger., 30.3.28).

Electric glow-discharge tubes. C. R. BURCH, F. E. BANCROFT, and ASSOCIATED ELECTRICAL INDUS-TRIES, LTD. (B.P. 333,692, 27.6.29).

Devices for irradiation of substances with ultra-violet rays. S. G. S. DICKER. From N.V. PHILIPS' GLOEILAMPENFABR. (B.P. 332,977, 13.5.29).

Electric incandescence lamps. Gen. ELECTRIC Co., LTD., Assees. of PATENT-TREUHAND-GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 333,858, 20.1.30. Ger., 10.8.29).

[Heater units for] thermionic cathodes of vacuum electric tube devices. A. S. CACHEMAILLE. From WESTINGHOUSE LAMP Co. (B.P. 333,011, 24.6.29).

[Chromium as getter in gas-filled] incandescence electric lamps. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of P. A. CAMPBELL (B.P. 312,613, 28.5.29. U.S., 28.5.28).

Galvanic batteries [with electrolyte reservoir]. H. D. ELKINGTON. From STICKSTOFFWERKE GES.M.B.H. (B.P. 319,785, 27.9.29).

[Filling device for] batteries. S. J. RUBINSTEIN (B.P. 333,291, 10.5.29).

Insulating material (B.P. 330,712). — See II. Alarms for melting-furnaces (B.P. 315,841). Steel alloy (U.S.P. 1,743,309). Magnetic alloy (U.S.P. 1,743,089). Plating metals with alloys (B.P. 301,812). Copper alloy [lead-in] wire (U.S.P. 1,744,717). Electrolytic gold and silver (B.P. 333,462).—See X.

XII.—FATS; OILS; WAXES.

Classification of cacao butter and its substitutes by the f.p. method. A. G. AVENT (Analyst, 1930, 55, 477-487).-The f.p. is determined on 75 g. of the fat or, in a modified test, on 10 g., which are placed in a boiling-tube maintained at not above 65°. When the fat has completely melted, the tube is placed in cold water, stirred until the temperature falls to 40°, wiped, the cork carrying the special thermometer and stirring rod fitted into the tube, and the fat stirred again until the temperature reaches 33°, when the tube is placed in an insulated jar, the neck plugged with cotton wool, stirring stopped at 31°, and the first reading (continued at 1-min. intervals) taken. The fat is stirred for 1 min. after the first visible separation of crystals, and then three times during each half minute, the procedure being continued for 10 min. after the maximum temperature is reached. Values for the maximum and minimum temperatures, the difference between them, and the time taken from 31° to the maximum when plotted give for each kind of fat a typical curve. Cacao butters with high maximum temperatures generally show high acid values. Tables of typical figures are given for cacao butters, veberine, kayao, Pontianak illipé, and various "butters." The more divergent is the cooling curve of a fat from that of a cacao butter, the less suitable was the fat found to be for chocolate making, also the greater its similarity, the more satisfactory was the substitute. D. G. HEWER.

M.p. range of cacao butter. J. D. VAN ROON (Chem. Weekblad, 1930, 27, 498—502).—The change of volume of the fat on melting is found to follow a characteristic course under standard conditions. A definite volume is introduced into a dilatometer, the instrument kept at 8° for 1 hr., then at 24° for 15 hrs., and finally the temperature is raised at the rate of 4° per hr. ; the readings plotted as ordinates against temperatures as abscissæ give a well-defined S-curve, the shape of which is modified by presence of adulterants; 10% of substitute suffices to mask the S-shape entirely. The reproducibility and the variations in the curve arising from variations in the pretreatment are discussed.

S. I. LEVY. Analytical methods for cottonseed. G. S. JAMIEson and R. S. MCKINNEY (Oil and Fat Ind., 1930, 7, 291—293, 315).—Details are given of provisional standard methods for the sampling of cottonseed, and for the determination of moisture, before and after fuming and grinding, and of free fatty acids.

E. LEWKOWITSCH. Fatty acids of high mol. wt. [arachidic and erucic acids] in linseed and soya-bean oils. J. GROSSFELD (Z. Unters. Lebensm., 1930, 59, 412-418). -Wallis and Burrows have reported the presence in the fatty acids contained in soya-bean oil of 1% of arachidic acid (cf. B., 1924, 838). Using the method previously developed (cf. Grossfeld and Simmer, B., 1930, 790), pure linseed and soya-bean oils as well as a sample of linseed oil suspected of adulteration with soya-bean oil were tested for fatty acids of high mol. wt. and the values compared with those for stearic acid. The results indicated the following contents of arachidic acid: linseed 0.73%, soya 0.85-0.88%, suspected sample 0.34%. Seven other samples of linseed oil gave values of 0.07-0.47%, calc. as arachidic acid. By fractional precipitation of the lead salt from dilute alcohol it was found that the potassium salt of the supposed arachidic acid formed a jelly in the presence of ether. Erucic acid was thus suspected and its presence was confirmed from the iodine value. The results gave an average value for linseed oil of 1.78% of erucic acid. When the presence of this acid is considered with reference to the total fatty acids in linseed and soya-bean oils it is found that the stearic acid content is extremely low, whilst the mean value for the palmitic acid content is 9%, assuming that 1% of the lead salt remains in solution. H. J. DOWDEN.

Selective hydrogenation of unsaturated fatty acids and their constitution. I. Linoleic acid. B. SUZUKI and Y. INOUYE (Proc. Imp. Acad., Tokyo, 1930, 6, 266-268).-The reduction of methyl linoleate with tetra- or deca-hydronaphthalene and palladised barium sulphate proceeds in two stages ; methyl oleate is formed as the intermediate. Oxidation of methyl linoleate with potassium permanganate in acetone containing a small amount of sodium hydrogen carbonate gives hexoic and azelaic acids, showing that linoleic acid is $\Delta^{\theta \lambda}$ -octadecadienoic acid. Similar oxidation of a half-reduced linoleic acid affords nonoic and azelaic acids, thus confirming the production of oleic acid. Similar hydrogenation of linolenic acid proceeds in H. BURTON. three stages.

Acetyl value of unsaturated fatty oils. S. UENO and N. KUZEI (J. Soc. Chem. Ind., Japan, 1930, 33, 234—236 B).—In the case of old samples of oils (except beef tallow) the acetyl value by the Lewkowitsch filtration method was greater than that obtained by the distillation process, the latter being nearer the true acetyl value. The difference was greatest (e.g., $33 \cdot 6$ and $12 \cdot 6$ for linseed oil) in the case of the most unsaturated oils; this is attributed to the formation of soluble dibasic acids during acetylation etc. The values for refined oils by both methods were in closer agreement and accorded with the values by André's procedure. The acetyl value of most fresh unsaturated oils was below 10; that of hardened fish oils was lower than that of the original oils. E. LEWKOWITSCH.

California olive oil. P. F. NICHOLS and B. E. LESLEY (Oil and Fat Ind., 1930, 7, 295-296, 315).--Various tests for rancidity were examined, of which the Kreis test, though not infallible, gave the most reliable results. Californian olive oil has characteristics of colour, viscosity, and free acidity similar to those of imported oils, but the deviations from the average are greater. Lovibond values of 80 yellow, 5 red, 2 blue, relative viscosity (efflux time compared with that of water at 20°) 15-16, and 1% of free fatty acids are recommended as tentative standards for examination, a slight positive Kreis reaction being permissible.

E. LEWKOWITSCH.

Dolphin oil. A. KLEIN and M. STIGOL (Pharm. Zentr., 1930, 71, 497-500).-Dolphin and cod-liver oils may be distinguished by certain colour reactions. E.g., on shaking the oil with (a) an equal volume of nitric acid $(d \ 1 \cdot 4)$ and a saturated solution of resorcinol in benzene, or (b) an equal volume of hydrochloric acid $(d \ 1.19)$ and an ethereal solution of phloroglucinol (1:1000), or (c) light petroleum and nitric acid $(d \ 1 \cdot 4)$, red colours are produced with dolphin oil and yellow with cod-liver oil. An oil from the Black Sea dolphin had: d 0.9285, acid value 0.365, saponif. value 209.5, iodine value 129.7, Reichert-Meissl value 32.98, Polenske value 3.29, unsaponifiable matter 0.2%, ether-insoluble acid polybromides 29.04%, and non-volatile fatty acids 87.32% (Hübl iodine value 147.57). The total fatty acids (95.01%) present in the oil had iodine value 130.94, mean mol. wt. 255.3, and contained 15.43% of "solid acids" (Twitchell) (m.p. $48-50^{\circ}$, iodine value $22 \cdot 26$, mean mol. wt. $258 \cdot 7$) and $83 \cdot 57\%$ of "liquid acids" (iodine value $142 \cdot 05$, mean mol. wt. $275 \cdot 4$). Linoleic and isovaleric acids were identified in the oil, which contained also stearic, palmitic, oleic, and highly unsaturated (clupanodonic) acids and probably one or more solid unsaturated acids. E. LEWKOWITSCH.

Composition of commercial palm oils. I. Fatty acids and component glycerides of some palm oils of low free acidity. T. P. HILDITCH and (MISS) E. E. JONES (J.S.C.I., 1930, 49, 363-369T).—Four commercial palm oils of low free acidity have been investigated and their characteristics are fully recorded. The fatty acids present had the following setting points and composition: Belgian Congo (neutral), $44\cdot4^{\circ}$, myristic $1\cdot2^{\circ}_{0}$, palmitic $43\cdot0^{\circ}_{0}$, stearic $4\cdot4^{\circ}_{0}$, oleic $40\cdot2^{\circ}_{0}$, linoleic acid $11\cdot2^{\circ}_{0}$; Malaya (crude), $45\cdot6^{\circ}$,

myristic 2.5%, palmitic 40.8%, stearic 3.6%, oleic 45.2%, linoleic acid 7.9%; Drewin (Gold Coast) (crude), 40.4°, myristic 2.3%, palmitic 34.3%, stearic 5.6%, oleic 49.5%, linoleic acid 8.3%; (neutral), 41.0°, myristic 1.4%, palmitic 32.7%, stearic 7.5%, oleic 51.7%, linoleic acid 6.7%; soft Cameroons (crude), 44.0°, myristic 1.0%, palmitic 38.9%, stearic 5.9%, oleic 43.9%, linoleic acid 10.3%; (neutral), 44.2°, myristic 1.4%, palmitic 40.1%, stearic 5.5%, oleic 42.7%, linoleic acid 10.3%. The glyceride structure of the four oils has been studied by the isolation and examination of the fully-saturated glycerides by means of oxidation with permanganate and acetone solution, and the percentages of fully-saturated glycerides found in the neutralised Belgian Congo, Malay, Drewin, and Cameroons oils were respectively 10, 9, 7, and 8. The fully-saturated glyceride content in palm oils appears to depend on the proportion of unsaturated acids in the total fatty acids of the fat and, correspondingly, the molecular proportion of saturated acids linked with 1 mol. of unsaturated acids in the form of mixed saturated-unsaturated glycerides varies from about 0.8 to 0.6:1. These relationships differentiate palm oil from palm-kernel oil and from seed fats in general, and indicate that the mode of assembly of fatty acids in the glyceride molecules in palm oil is somewhat analogous to that in such animal fats as tallows and butters. The saturated fatty acids both of the original oil and of the fully-saturated glyceride portions contained 85-90% of palmitic acid, and consequently tripalmitin is the main component of the fully-saturated glycerides of palm oil (6-7% of the whole fat). The greater part of palm oil is made up of mixed glycerides in which mono-oleodipalmitins and dioleomonopalmitins must predominate.

Testing of oils and fats for rancidity. J. DAVID-SOHN (Chem.-Ztg., 1930, 54, 606—607).—Cf. B., 1930, 871.

Fatty acids from oxidation of mineral oils. Collin.—See III. Pine resin in mixtures. Donath.— See XIII.

See also A., Aug., 1020, Determination of degree of unsaturation of oils and fats (SMIT). 1056, Composition of fat of silver-black fox (SCHUETTE and THOMAS). 1057, Neutral fat of liver and other tissues of the ox (BLOOR and SNIDER). Unsaturated acids of oil of *Labeo Rohita* (CHOWDHURY and SARKAR). 1057, Determination of neutral fat in animal substances (ZINZADZE).

PATENTS.

Bleaching fats and oils. H. F. TAYLOR, E. F. SCHERUBEL, and G. W. PHELPS, ASSTS. to SWIFT & Co. (U.S.P. 1,744,843, 28.1.30. Appl., 26.4.24).—Bleaching earth (1-10%) and sulphuric acid (e.g., 2—8% of acid of d 1.70) are added simultaneously, or in immediate succession, to the heated oil (55—106°) during vigorous agitation which is continued until the desired bleaching has been obtained (e.g., $\frac{1}{2}$ —1 hr.); the oil is then allowed to settle or is neutralised with, e.g., calcium carbonate, and filtered. E. LEWKOWITSCH. XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Determination of the transparency to light of turbid media. ANON. (Jahresber. VII., Chem.-Tech. Reichsanst., 1928, 222—229; Chem. Zentr., 1930, i, 1976).—Two methods for the determination of the covering power of paints are described.

A. A. ELDRIDGE.

Fastness [of colours] to light. H. J. STERN (J. Oil Col. Chem. Assoc., 1930, 13, 184—192).—A lecture, in which the methods previously proposed for measuring the fastness of colours to light are critically reviewed; a system combining the advantages of "the exposure for a given time" methods with those of the "reference to standard types" methods is recommended. Fading lamps will only grade a colour and are not considered satisfactory as it is impossible to say that results are equivalent to so many hours of sunlight. In some instruments employing artificial light, the internal temperature and humidity are so high as to cause undue fading.

F. C. HARWOOD.

Detection and determination of pine-rosin in various mixtures. E. DONATH (Chem.-Ztg., 1930, 54, 667).—The author's nitric acid test for the detection of rosin in waxes (cf. Dingler's Polytech. J., 1872, July, 2) can be applied quantitatively with the aid of a simple colorimeter. This colour reaction may be used to determine rosin in impregnated papers in the presence of wool fat etc. when the Storch-Morawski reaction is inapplicable. E. LEWKOWITSCH.

X-Ray examination of lithopones. W. A. WOOD (J.S.C.I., 1930, 49, 300—301 r).—The question as to whether zinc lithopone is a mixture of zinc sulphide and barium sulphate or a compound or a solid solution of one in the other is investigated with the help of X-ray methods. The type of problem in which X-rays might be used with advantage is discussed. Measurements are given showing definitely that the material is not a compound but a mixture. A similar result is found for cadmium lithopone.

Mixer. Zakarias. See I. Testing of acetylcellulose. Fermazin.—See V.

PATENTS.

Preparation of β -elæostearin and coating compositions containing it. E. I. DU PONT DE NEMOURS & Co. (B.P. 312,052, 15.4.29. U.S., 18.5.28).— β -Elæostearin is "run" at approx. 260°, being thus rendered soluble in high-boiling gasoline or naphtha and suitable when incorporated with resins, driers, pigments, etc. for use as coating compositions.

S. S. WOOLF.

(A, C) Coating compositions. (B) Varnish. C. I. B. HENNING, C. E. BURKE, and E. E. REID, Assrs. to E. I. DU PONT DE NEMOURS & CO. (U.S.P. 1,742,507-9, 7.1.30. Appl., [A] 27.7.28, [B] 30.7.28, [c] 5.7.29).— The heavy-metal salts of monoalkyl phthalates are added (A, C) to nitrocellulose lacquers or (B) to oil varnishes. Examples are (A) zinc *n*-butyl phthalate (0.5 pt.) with pyroxylin (1 pt.) and a volatile solvent; (B) cobalt butyl phthalate in a varnish containing tung oil, linseed

oil, rosin, and turpentine; (c) cupric, ferrous, or ferric *n*-butyl phthalate with pyroxylin and a solvent.

C. HOLLINS.

Manufacture of lacquers, priming compositions, etc. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 330,895, 15.3.29).—The resins made by condensing acylated polyhydric alcohols, in which at least one free hydroxyl group is retained, with polybasic carboxylic acids are incorporated with cellulose ethers in organic solvents. Example re: cellulose ethyl ether with the resin from phthale cid and glycerol mono- or dilinoleate or ricinoleate, or colophony glyceride, or β hydroxyethyl linoleate; cellulose benzyl ether with the resin from glycerol, colophony, palmitic acid, and maleic acid. C. HOLLINS.

Preparation of [resinous] condensation products of acetylene and phenols. C. F. SCHRIMPE, Assr. to BAKELITE CORP. (U.S.P. 1,742,519, 7.1.30. Appl., 8.3.27).—4:4'-Dihydroxy-αα-diphenylethane (ethylidenediphenol) is obtained by passing acetylene through a mixture of phenol with a little sulphuric acid and mercuric sulphate in the absence of water or added solvent. C. HOLLINS.

Manufacture of synthetic resins. I. G. FARBEN-A.-G. (B.P. 310,816 and Addn. B.P. 332,963, IND. 30.4.29. Ger., [A] 30.4.28).-(A) Crude solvent naphtha in the presence, if desired, of a phenol or a naphthol is treated with a fluoroboro-fatty acid, e.g., fluoroboroacetic acid, the temperature being kept below 70°, e.g., by addition of an indifferent solvent. The reaction product is treated with an alkali or alkaline-earth oxide and the volatile constituents are removed by known methods from the filtered resin solution. (B) A compound of boron fluoride with an aliphatic hydroxycarboxylic acid, e.g., lactic acid, or with an aliphatic unsaturated acid, e.g., oleic acid, is used in place of the fluoroboro-fatty acid. S. S. WOOLF.

Manufacture of phenol-formaldehyde condensation products. KUNSTHARZFABR. DR. F. POLLAK GES.M.B.H. (B.P. 312,905, 13.3.29. Austr., 1.6.28).— In the processes described in B.P. 267,901 and 290,963 (B., 1928, 720; 1929, 404) phenols, carbamides, etc. are added to the condensation solution towards or at the end of the condensation process for the purpose of binding free formaldehyde. An initial solution of low viscosity is obtained by working at lower temperatures for shorter times with smaller amounts of catalyst, in order to allow for the increase of viscosity caused by the subsequent addition. S. S. WOOLF.

Production of shaped articles from urea or thiourea, solid polymerised formaldehyde, and fillers. BAKELITE GES.M.B.H. (B.P. 332,964, 28.1.29. Ger., 3.2.28. Cf. B.P. 305,211; B., 1930, 828).—The dry constituents are mixed in the hot and the reaction mass is shaped by hot-pressing with no intermediate treatment. S. S. Woolf.

Floor coverings [e.g., linoleum]. ARMSTRONG CORK Co., Assees. of J. C. McCarthy (B.P. 317,756, 20.7.29. U.S., 21.8.28).

Esters of fatty acids (U.S.P. 1,739,315). Driers for paints (U.S.P. 1,742,506).—See III. Azo pigments (B.P. 331,247).—See IV. Plasticisers (B.P. 312,606). Cellulose derivative compositions (B.P. 308,657).— See V.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Solubility of oxygen in rubber and its effect on rate of oxidation. I. WILLIAMS and A. M. NEAL (Ind. Eng. Chem., 1930, 22, 874-878).-The solubility of oxygen in rubber follows Henry's law, the quantity of gas dissolved being proportional to the pressure; it decreases with increase of temperature. The oxidation of raw or vulcanised rubber (the former with the addition of copper stearate) is found to be independent of the oxygen concentration as long as this is above a certain minimum. The process probably involves a series of reactions, the controlling reaction being a slow one in the rubber preceding the oxidation. Rate of chemical absorption increases with temperature, being doubled at lower temperatures for a rise of 7-10°, but the increase appears to be much less at higher temperatures, e.g., at 70°, this reduction arising from the inability of oxygen to penetrate by diffusion as fast as it is being consumed. Near or above 70° the deterioration of rubber seems to be hastened by a second type of oxidation which is influenced by the concentration of oxygen and by high pressures. In artificial ageing tests it is necessary to consider the concentration of the oxygen in the rubber. The concentration of oxygen in rubber suspended in air at 70° will be less than that required for normal oxidation at the maximum rate, and this will limit the value of tests in air to thin slabs of highest grade, the rate of oxidation of which will be small relative to the rate of diffusion. The solubility of oxygen at 70° and atmospheric pressure is slightly greater than that necessary for uniform oxidation, and suffices for the satisfactory accelerated ageing of thin slabs of rubber of good or medium quality. Simultaneous use of high temperatures and high pressures for accelerated ageing should be avoided. D. F. Twiss.

Effect of pigmentation on the work of retraction of rubber compounds. F. S. CONOVER (Ind. Eng. Chem., 1930, 22, 871-874) .- Although various reinforcing agents and mineral fillers exert different effects on the work involved in the extension of the compounded rubber, the energy of retraction as indicated by the area between the retraction curves and the elongation axes for mixtures at comparable degree of vulcanisation is substantially independent of the kind or proportion of the compounding ingredient; e.g., vulcanised mixtures containing, respectively, carbon black 5 vols., clay 20 vols., and zinc oxide 30 vols. per 100 vols. of rubber exhibit almost the same work of retraction from equal elongations. Barytes constitutes an exception, possibly because of the presence of vacuoles in the stretched rubber. Work of retraction is influenced, however, by the state of vulcanisation of the mixture.

D. F. Twiss.

Carbon black in rubber insulating compounds. W. B. WIEGAND and C. R. BOGGS (Ind. Eng. Chem., 1930, 22, 822-825).—Carbon black may be incorporated in rubber without impairing its insulating and dielectric properties; fresh, uncompounded carbon black must be employed. The ability of carbon black to adsorb water and dissolved electrolytes from the rubber causes an increase sometimes exceeding 50% in the dielectric qualities. The useful maximum of carbon black is about 10% on the rubber content. D. F. Twiss.

Behaviour of various clays with crude and reclaimed rubber. H. A. WINKELMANN and E. G. CROAK-MAN (Ind. Eng. Chem., 1930, 22, 865—869).—Tests on a number of commercial clays showed no relationship between the iron oxide content and the rate of accelerated ageing of rubbers containing them, either in the oven test or the bomb test. Chemical analysis generally gives little information concerning the probable behaviour of clays in rubber, but acidity or alkalinity should be determined on account of its influence on rate of vulcanisation. Microscopical examination permits a rapid estimation of the reinforcing value to be made. In general, the effect of clays is the same in reclaimed as in crude rubber. D. F. Twiss.

Influence of rubber "resins" in zinc oxide accelerator mixings. W. S. DAVEY (J.S.C.I., 1930, 49, 338-343 T).-A comprehensive survey of the activating effect of different amounts of zinc oxide, with or without rubber " resin," on a number of typical accelerators is recorded. The results generally confirm those previously obtained by Martin and Davey (ibid., 1923, 42, 98 T; 1925, 44, 317 T), viz., that fatty acids exert their maximum effect in the presence of 5 pts. of zinc oxide per 100 of rubber. A smaller amount of zinc oxide (say 1 pt.) is insufficient to produce the full activating effect, even in the presence of fatty acids. A larger amount of zinc oxide (say 20 pts. or more) is sufficient to satisfy the requirements of the accelerator and therefore the presence of fatty acids is relatively unimportant. Fatty acids ensure an even distribution of zinc oxide, so that with 5 pts. of zinc oxide there is sufficient zinc oxide surface available for maximum activation in the presence of fatty acids, but not in their absence.

PATENTS.

Treatment of [rubber] latex. NAUGATUCK CHEM. Co., Assees. of E. HAZELL (B.P. 333,391, 7.8.29. U.S., 5.10.28).—Treatment of rubber latex with a substance of the constitution $M \cdot O \cdot Hal$, where Hal represents a halogen atom and M is an alkali or alkaline-earth metal, an alkyl group, or hydrogen, increases the adhesiveness of the unvulcanised rubber, and also deodorises the latex, increases its mechanical stability, its resistance to putrefaction, and its filterability, and facilitates its creaming. The preferred agent is a hypochlorite, the activity of which can be increased by decreasing the $p_{\rm H}$ of the mixture, an emulsifying agent, e.g., a complex sulphonic acid, being simultaneously applied, if desired, to assist in stabilising the latex. A thiosulphate may be added subsequently to remove surplus hypochlorite.

D. F. Twiss.

Accelerating the vulcanisation of natural and artificial varieties of rubber. A. CARPMAEL, From I. G. FARBENIND, A.-G. (B.P. 333,174, 2. and 14.5.29).— Vulcanisation is accelerated by a condensation product of ammonia with an unsaturated aldehyde, such as crotonaldehyde, acraldehyde, or homologues of the latter. The accelerators, *e.g.*, tricrotonylidenetetramine, may be used singly or jointly. D. F. Twiss.

Accelerating the vulcanisation of natural or artificial varieties of rubber. I. G. FARBENIND. A.-G. (B.P. 312,069, 11.5.29. Ger., 18.5.28).—Liquid derivatives of guanidine, *e.g.*, pentamethyl- and pentabutylguanidine, have an advantage as accelerators of vulcanisation in that they are easily incorporated in rubber. They possess a dissociation constant exceeding 1×10^{-8} (cf. B.P. 12,661 of 1914; B., 191, 2.062).

Manufacture of rubber or like [seamless, multicompartment] articles. JUNLOP RUBBER Co., LTD., and E. W. B. OWEN (B.P. 333,331, 31.5.29).

Artificial ebonite (B.P. 330,712).—See II. Polymerisation of diolefines (B.P. 331,265).—See III. Insulating materials (B.P. 333,290). Insulated cables (B.P. 332,891).—See XI. Leavening rubber (B.P. 311,389).—See XIX.

XV.-LEATHER; GLUE.

Madagascar barks containing tannins. A. DEFORGE, J. MAHEW, and H. DE BALSAC (Halle aux Cuirs, Tech. Suppl., 1929, 49—57, 84—92, 119—123, 144— 149, 175—183; Chem. Zentr., 1930, i, 1573).—Wattle bark contained tans $24 \cdot 3$ —27 $\cdot 8$, non-tans $5 \cdot 4$ —10 $\cdot 4$, insoluble matter $51 \cdot 9$ —57 $\cdot 2$, and water $9 \cdot 4$ —12 $\cdot 7 ^{\circ}_{0}$. The tannin is of the catechin type. The bark of *Terminalia Catappa*, L., contains pyrogallol and catechin tannins 11 $\cdot 8$, non-tans $4 \cdot 4$, insoluble matter 73 $\cdot 2$, and water 10 $\cdot 6 ^{\circ}_{0}$. "Rotra" (*Eugenia*) bark contains tans 12 $\cdot 6$, non-tans 12 $\cdot 2$, insoluble matter 61 $\cdot 5$, and water 13 $\cdot 7 ^{\circ}_{0}$. The tannins are of the pyrogallol and catechin groups. A. A. ELDRIDGE.

Mechanism of vegetable tanning. I. Acidity characteristics of [tan] liquors and extracts. D. H. CAMERON and G. D. MCLAUGHLIN (J. Amer. Leather Chem. Assoc., 1930, 25, 325-358).-Acetic acid was determined in a number of tan liquors by distilling it over in steam. Direct distillation removes some lactic acid. The amount of diffusible material in the tan liquors was determined by diffusion through a "Cellophane" sheet in 24 hrs., and the organic acids were determined by extracting the diffused material with ether. Pyrocatechol, resorcinol, and quinol were also identified in the ethereal extract. Gallic acid was determined in the ethereal extract by diluting, evaporating to dryness, and titrating with 0.1N-sodium hydroxide. A modified fluorescein indicator was evolved for the determination of the "total titratable acidity" of dark coloured tan liquors. Analytical data were thus obtained for samples of actual process tan liquors including those of chestnut, quebracho, hemlock, oak bark, and cutch extracts. It is shown that the acids present in tan liquors, chiefly acetic, lactic, and gallic, are responsible for the characteristic $p_{\rm H}$ values of the tan liquors, and that whilst the tannins themselves are capable of reacting with alkali, such action is most marked at pH values above 6. D. WOODROFFE.

"Red heat" in salted hides (MISS) D. J. LLOYD [with R. H. MARRIOTT and (MISS) M. E. ROBERTSON] (Collegium, 1930, 270—296).—See B., 1930, 251. Red discoloration of salted hides and salt stains. M. BERGMANN (Collegium, 1930, 255-269).—See B., 1930, 433.

Inclusions in fruits. NIETHAMMER.—See XIX.

See also A., Aug., 994, Relation of hydration of gelatin to swelling (NEVILLE and THEIS).

PATENTS.

Manufacture of tawed leather. J. Y. JOHNSON. From E. STIASNY (B.P. 333,221, 28.1.29).—Skins are treated with a solution of a complex compound of aluminium, in which one radical of carboxylic acid, or an acid synthetic tanning agent, and one sulphurous acid radical are combined with the aluminium. Alternatively, the skins may be treated first with an aqueous solution of a soluble aluminium compound, *e.g.*, alum, sodium chloride, and sodium lactate, and subsequently with an aqueous solution of the ingredients forming the desired complex compound with the aluminium, *e.g.*, alum, lactic acid, sodium sulphite, and a synthetic tannin. [Stat. ref.] D. WOODROFFE.

Manufacture of tanning agents. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 331,216, 25.3.25).— Resorcinol or pyrogallol (3 mols.) is condensed with benzaldehyde (1—1.5 mols.) in water containing a little acid, reaction being stopped by neutralisation before all the phenol has reacted. Clear brown syrups are obtained which have powerful tanning properties. Substituted benzaldehydes (salicylaldehyde, o-chlorobenzaldehyde) may also be used, in which case any crystalline product separating out is removed. C. HOLLINS.

Manufacture of tanning agents [chlorinated products of degraded lignite etc.]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 332,204 and 332,270, 15.4.29).—The dried chlorinated products obtained according to B.P. 284,670 or 323,781 (B., 1929, 505; 1930, 311) are (A) extracted with an organic solvent, e.g., crude wood spirit, methyl or ethyl alcohol, and the solution obtained is either evaporated, or precipitated by the addition of a salt of a weak acid, a base, or an organic precipitant (e.g., benzene), or are (B) incorporated either with gelatin-precipitating, water-soluble condensation products of hydroxyaryl compounds (e.g., resorcinol) and aldehydes not containing sulphonyl groups, or with condensation products of di- or poly-hydroxybenzenes and formaldehyde, with or without the addition of an acid, a neutralising agent, and a synthetic or acid vegetable tanning agent. D. WOODROFFE.

Depilating hides and skins. M. BERGMANN (U.S.P. 1,765,199, 17.6.30. Appl., 27.6.25. Ger., 12.2.25).— See B.P. 247,826; B., 1926, 377.

Phenolic tanning agents (B.P. 302,666 and 302,938). —See III.

XVI.—AGRICULTURE.

Microbiological analysis of soils. Influence of continuous unbalanced manuring on the growth and development of Azotobacter chroococcum. T. BAUMGARTEL and C. BIHLER (Landw. Jahrb., 1930, 71, 855—876).—Active forms of Azotobacter chroococcum were present in all soils irrespective of the fertiliser treatment, but development in enrichment cultures was in some cases characteristic of the fertilisers used. The use of phosphate fertilisers definitely improved the development of the organism. In cultures from soils receiving nitrogen but no phosphate, development was retarded or weakened. With all fertiliser mixtures which included nitrogen and potash, or nitrogen, potash, and phosphate, growth and development of the organism was similar. A study of the growth of *Azotobacter* gives valuable information as to the physical and chemical properties of soils. A. G. POLLARD.

Methods for determining the nature and abundance of soil organic matter. S. A. WAKSMAN and K. R. STEVENS (Soil Sci., 1930, 30, 97-116).-Existing methods for the examination of soil humus are investigated and discussed. Total soil organic matter is best determined as $1.72 \times \text{total}$ organic carbon content. Determinations of "humus" or "humic acid" in soils by alkaline extraction or by oxidation cannot be used as a basis of calculation of the total organic matter present. From 90 to 95% of the total organic matter may be classified in groups of definite chemical complexes by the following procedure. Fats, waxes, and resins are extracted with ether followed by alcohol or with a 1:1 alcohol-benzene mixture. The extracted residue is decomposed with sulphuric acid and is subsequently extracted with water. In the solution, sugars (as a measure of total carbohydrates) and total and ammoniacal nitrogen may be determined. In the weighed residue the carbon and nitrogen contents are determined and the proportion of lignin is calculated from the C: N ratio. Organic matter in soils consists largely of "soil lignins" and "soil proteins" with small proportions of fats, waxes, resins, and certain carbohydrates including hemicelluloses and cellulose-like substances.

A. G. POLLARD.

Exchangeable cations and lime requirement in differently fertilised soils. S. RAVIKOVITCH (Soil Sci., 1930, 30, 79—95).—Methods for the determination of exchangeable bases in soils by neutral salt leaching are examined. Hissink's correction for dissolved calcium carbonate was unsatisfactory in limed soils, but the methods of Gedroiz and of Tyurin gave almost identical results for the value. The exchangeable calcium content of soils was increased in all cases by applications of calcium carbonate, and to a certain extent by superphosphate, but was reduced markedly by ammonium sulphate and to a lesser extent by potassium chloride on both limed and unlimed soils. Farmyard manure increased the total base-exchange capacity of soils and the exchangeable calcium content of limed soils.

A. G. POLLARD.

Weathering complex of soil. R. GANSSEN (Mitt. Lab. Preuss. Geol. Land., 1929, No. 8, 1—9; Chem. Zentr., 1930, i, 1851).—The method of van Bemmelen and Hissink is criticised. Determinations of the exchange acidity and of the $p_{\rm H}$ are nearly parallel with the mol. ratio of adsorbed bases to alumina.

A. A. ELDRIDGE.

Composition of natural organic materials and their decomposition in the soil. V. Decomposition of various chemical constituents in plant materials, under anaerobic conditions. F. G. TENNEY and S. A. WAKSMAN (Soil Sci., 1930, 30, 143–160; cf. B., 1929

904).—Plant materials generally decompose much more slowly under anaerobic than under aerobic conditions. Differences in the rate of decomposition of lignins and organic nitrogen complexes as compared with that of cellulose and hemicellulose are particularly marked. The anaerobic decomposition of maize stems, rice straw, oak leaves, and sphagnum is examined and the results are used to explain differences in peat formation. Low-moor peat is formed from plants in which cellulose and hemicelluloses decompose rapidly and lignins and proteins accumulate. In high-moor peats from sphagnum, the polysaccharides are less easily decomposed and cannot serve as energy sources for micro-organisms. The latter are unable to utilise the nitrogen rendered available by the more readily decomposed organic A. G. POLLARD. nitrogen complexes.

Potash in bog soils. TACKE (Ernähr. Pflanze, 1930, 26, 1-5; Chem. Zentr., 1930, i, 1674).—Bog soils lack potash. Results of potash fertilisation for potatoes and grain are recorded. A. A. ELDRIDGE.

Presence of Azotobacter and absence of Thiobacillus thio-oxidans in peat soils. C. E. SKINNER and I. J. NYGARD (Ecology, 1930, 11, 558—561).— Azotobacter are active in peat soils only at $p_{\rm H} > 5 \cdot 9$. A. chroococcum were found in the more basic soils and A. Beijerinckii in those approaching the acid limit. Thiobacillus thio-oxidans was not found in peat except where sulphur had previously been used as a fertiliser.

A. G. POLLARD.

Availability of manganese and of iron as affected by applications of calcium and magnesium carbonates to the soil. H. B. MANN (Soil Sci., 1930, 30, 117-141).-The acidity of the soils examined was reduced by equivalent amounts by moderate applications of calcium and magnesium carbonates. The effect of the latter is relatively smaller when applied in larger amounts. Liming decreased the solubility of manganese in the soils, smaller applications having a relatively greater effect. The solubility of iron was increased by moderate liming but decreased with larger applications. The increased solubility produced by magnesium carbonate was more persistent than with calcium carbonate. Soya beans grown in soils treated with calcium or magnesium carbonates and fertilisers responded to lime. Heavy dressings of calcium carbonate reduced the crop and large amounts of magnesium carbonate were toxic. Manganese absorption by plants varied with solubility of manganese in the soil, absorption decreasing at the point of maximum yield. Manganese chlorosis was observed in a sandy loam limed to $p_{\rm H}$ 8.4, and was remedied by applications of manganese sulphate to the soil or in very dilute solutions to the leaves. Applications of iron, magnesium, copper, or barium salts to soil or foliage were without effect on the chlorosis. Manganese chlorosis is not a systemic deficiency, since localised applications of manganese cause a complete recovery of the part treated. Excessive liming of light soils produces a chlorosis specifically due to manganese deficiency and not associated with a deficiency of iron.

A. G. POLLARD. Effect of fertilisation on the permeability of soil. B. GANOSSIS (Praktika, 1928, 3, 696-698; Chem. Zentr., 1930, i, 1852).—Continuous fertilisation with stable manure, but not that with artificial manures, considerably diminishes the permeability of the soil to water. A. A. ELDRIDGE.

Nature of the yield curve [of plants] with increasing applications of potash. H. WIESSMANN, and K. NAUMANN (Landw. Jahrb., 1930, 72, 105—123). —The yield curve of oats and rye grass with increasing supplies of potash approximated to the logarithmic type of Mitscherlich. Later sowing of the seed caused slight increases in the "effect factor" of potash. The mean values of the "effect factor" of potash with rye grass and with oats were similar, but with the former crop there was a slightly decreased value with the higher applications of potash. In general, values of the "effect factors" for potash were slightly smaller than those of Mitscherlich. A. G. POLLARD.

Fertilisation of acid soil with potassium salt. H. KAPPEN (Ernähr. Pflanze, 1930, 26, 6—10; Chem. Zentr., 1930, i, 1674).—Yields of rye, oats, and potatoes were not increased, but addition of Thomas meal or chalk gave high yields. The results support Ehrenberg's lime-potash law. A. A. ELDRIDGE.

Action of ammonium sulphate and of saltpetre on development of sugar beet and maize in relation to composition of the nutrient solution. I. G. DIKUSSAR (Landw. Jahrb., 1930, 72, 79-104).-Sandculture experiments are described in which a continuous flow of nutrient of controlled $p_{\rm H}$ value was arranged. The growth of sugar beet in the absence of peat was normal. The effect of sulphate and nitrate of ammonium and nitrate and nitrite of sodium as sources of nitrogen for maize and sugar beet depended on the $p_{\rm H}$ of the nutrient. At $p_{\rm H}$ 5.5 the efficiency of these substances was in the order $NaNO_3 > NH_4NO_3 = NaNO_2 > (NH_4)_2SO_4$. At $p_H 7.0$ ammonium sulphate was superior to all other forms of nitrogen. An increase in the concentration of the calcium, magnesium, and potassium salts in the nutrient improved the efficiency of ammonium sulphate, but did not affect that of sodium nitrate. On the other hand, at $p_{\rm H}$ 7.0 a decreased concentration of these salts weakened the effect of ammonium sulphate and increased that of sodium nitrate. The relative efficiencies of ammonium sulphate and sodium nitrate are not definite, but can be controlled by the nature and proportions of the other constituents of the nutrient solution. Ammonium salts produced a smaller proportion of ash contents in the plants than did sodium nitrate. This is traced to the inhibitory effect of the ammonium ion on the permeability of the roots to calcium and magnesium ions. A. G. POLLARD.

Behaviour of tricalcium phosphate in cultivated soils. H. DANNEEL and K. W. FRÖHLICH (Landw. Jahrb., 1930, 72, 51—58).—Tricalcium phosphate does not dissolve in water in the molecular form. The ratio CaO: P_2O_5 in solution varied from 1:1.1 at dilutions of 1 in 200 to 1:2.6 at dilutions of 1 in 50,000. The bearing of this on the composition and solubility of naturally occurring phosphates is discussed.

A. G. POLLARD.

Physical and chemical properties of commercial arsenical insecticides. I. Manganese arsenate.

F. E. DEARBORN (J. Econ. Entom., 1930, 23, 630-635). —Commercial manganese arsenate is a mixture of manganese and calcium arsenates, oxides of manganese, and small proportions of iron, alumina, and silica. No common standard of composition exists among commercial samples. A. G. POLLARD.

"Penetrol" [insecticide] as an activator for nicotine. J. L. HOERNER (J. Econ. Entom., 1930, 23, 174-177).—" Penetrol" (a sulphonated oxidation product of petroleum) was more effective than potassium fish-oil soap as an activator for nicotine used against several species of aphids. A. G. POLLARD.

Reducing the unit charge of nicotine [in plant sprays]. R. S. FILMER (J. Econ. Entom., 1930, 23, 165—169).—Laboratory and orchard tests show that the toxic concentration of nicotine to aphis is reduced to 1:5000 when 0.5% of sodium oleate is included in the spray. Neither sodium oleate nor potassium oleate injured orchard tree foliage, even when the leaves were coated with lead acetate or sulphur from previous sprays. A. G. POLLARD.

Preliminary report on *p*-dichlorobenzene solutions for the control of the lesser peach borer (Algeria pictipes, G. and R.). O. I. SNAPP (J. Econ. Entom., 1930, 23, 636–638).—Favourable results are recorded. The highest percentage kill was obtained by painting infected portions of trees with a solution containing 1 lb. of *p*-dichlorobenzene in 2 quarts of crude cottonseed oil. A. G. POLLARD.

Naphthalene fumigation at controlled concentrations. A. HARTZELL and F. WILCOXON (J. Econ. Entom., 1930, 23, 608—618).—Red spider mites, cyclamen mites, and thrips were controlled by a concentration of 0.008 lb. of naphthalene per 1000 cub. ft. of air at 30.5° (average) and at R.H. 60%. Plant injury under these conditions was restricted to a very few species. A. G. POLLARD.

Carbon dioxide as an aid in the fumigation of certain highly adsorptive commodities. R. T. COTTON (J. ECON. ENTOM., 1930, 23, 231-233).—Admixture of carbon dioxide with fumigant vapours (e.g., chloropicrin and ethylene oxide) considerably facilitated the destruction of the flour beetle (*Tribolium confusum*) in nut-meats. A. G. POLLARD.

Comparative insecticidal value of different species of *Derris*. E. R. DE ONG (J. Econ. Entom., 1930, 23, 619-624).--Five species of *Derris* all proved of insecticidal value. The toxic material was present in all parts of the plants. *D. elliptica* is probably slightly superior to the other species. A. G. POLLARD.

Relation of evaporation to killing efficiency of soap solutions on the Harlequin Bug and other insects. B. B. FULTON (J. Econ. Entom., 1930, 23, 625-630).—Several minutes' contact is necessary for the penetration of a toxic dose of soap owing to the insects' power of closing the spiracles. The efficiency of a soap solution is inversely proportional to the rate of its evaporation. The addition of hygroscopic substances did not appreciably increase the efficiency.

A. G. POLLARD.

Sodium in crops. V. VINCENT and J. HERVIAUX (Ann. Sci. agron. Franç., 1929, 46, 444-460; Chem. Zentr., 1930, i, 1809).—Sodium is most abundant in those plant organs which display greatest physiological activity. Soil acidity appears to favour the accumulation of sodium. Sodium alone is not a fertiliser, but sylvinite, rich in sodium chloride, affords better yields of beet than does potassium chloride.

A. A. ELDRIDGE.

Economic principles of stall manure management. M. RAUTERBERG (Landw. Jahrb., 1930, 71, 921-1010).—A comprehensive survey of the uses and makng of stall manure under varying natural and farm conditions. A. G. POLLARD.

Yields of crude and assimilable nutrient by double and treble mowing of meadows after various fertiliser treatments. H. JANTZON and W. KIRSCH (Wiss. Arch. Landw., 1929, B, 1, 166-178; Chem. Zentr., 1930, i, 1850).

Peat-growing plants. WAKSMAN.—See II. Fluosilicates and fluoaluminates. CARTER.—See VII. Elements in cereal grains. SCHMORL. Finland cows' milk. VIRTANEN. Fodder and quality of milk. HERRMANN. Coagulability of milk. WURSTER. F.p. of milk from diseased cows. VAN RAALTE.—See XIX.

PATENTS.

Preparation of organic mercuric compounds suitable for use in seed disinfectants. (SIR) G. C. MARKS. From E. I. DU PONT DE NEMOURS & Co. (B.P. 331,494, 21.1.29).—A mercuric salt is caused to react with an alkyl, aryl, or aralkyl derivative of lead or tin, or with a mixture of sodium-lead alloy and an alkyl salt; a solvent is preferably present. Mercuric chloride and lead tetraethyl in alcohol give ethyl mercurichloride, m.p. 193°. The phenyl mercurichloride, m.p. 252°, cyclohexyl mercuriacetate, and benzyl mercuriacetate are also described. The best yields are obtained with mercuric acetate in acetic acid. C. HOLLINS.

Fertilisers (B.P. 331,546).—See XXIII.

XVII.—SUGARS; STARCHES; GUMS.

Effect of temperature on the sulphur dioxide content of corn syrup in mixtures of sugar and corn syrup. R. H. MORGAN (Analyst, 1930, 55, 488-495).—Since corn syrup and sugar may contain, respectively, 450 and 70 p.p.m. of sulphur dioxide, and since the longer is the time of boiling, the more sulphur dioxide is expelled, it has been possible to use certain bleaching agents without detection. However, the addition of such agents may be ascertained if a curve be plotted of residual sulphur dioxide against temperatures of boiling. The proportions of sugar and corn syrup are determined by analysis and the temperature to which the mixture has been boiled is indicated from the dry solids content. Assuming the maximum permissible amount of sulphur dioxide, a corresponding curve may be drawn giving the maximum amounts of sulphur dioxide in p.p.m. to be expected at the various temperatures, for it is shown that residual sulphur dioxide diminishes with rise in temperature to which the mixture is heated, and further that the amount of sulphur dioxide evolved increases with this temperature, and that a determination of dry solids is a measure of the boiling temperature.

D. G. HEWER.

PATENTS.

Manufacture of starch products. INTERNAT. PATENTS DEVELOPMENT Co. (B.P. 332,680, 27.5.29. U.S., 26.12.28) .- Starch products of colloidal character, when mixed with cold water, are produced by gelatinising by heat and pressure the raw material, which consists of a starch and water mixture containing non-starch substances and taken from the wet-milling process of making starch from maize or similar grain. The gelatinising apparatus consists of a pair of hollow, heated rolls, a hopper to contain the moist starch, arranged above the rolls, and a mechanism for spreading the starch from the hopper into a thin layer and feeding it C. RANKEN. between the rolls.

Production of starch capable of swelling in cold water. O. MEYER (U.S.P. 1,773,056, 12.8.30. Appl., 8.5.26. Ger., 14.12.25).—See B.P. 286,377; B., 1928, 345.

XVIII.—FERMENTATION INDUSTRIES.

Calculation of the original gravity of beer. R. SAAR (Chem.-Ztg., 1930, 54, 639).—The original gravity of beer was formerly calculated from $S = 100 \times (E + 2.0665 A)/(100 + 1.0665 A)$, where S is the gravity, E the extract, and A the alcohol, all the values being expressed in wt.-%. A first approximation to the value of the original gravity is obtained from the expression E + 2A, and if this is designated by s, the new formula becomes S = s - 0.0107A(s - 6.24), where 6.24 is the value of S at which it is exactly equal to E + 2A. C. RANKEN.

Composition of light lager beers. E. REMY (Z. Unters. Lebensm., 1930, 59, 402-406).-Examination of eight varieties of lager beer has shown that the physical constants and chemical constitution are generally similar. The content of alcohol and extractable material may be readily calculated from the surface tension by means of formulæ (i) $E = 3 \cdot 3 \times$ $[s_1 + (s_1 - s_2)]$, (ii) $A = 2 \cdot 7s_2$, where E and A are the extractable material and alcohol content, respectively, and s_1 and s_2 the relative surface tensions of the beer and the alcoholic distillate, respectively. The calculated values agree to within $\pm 0.04\%$ with those obtained by direct determination. The average values were alcohol 3.19%, extractable material 4.88%, mineral matter 0.227%, total nitrogen 0.069%, refraction of beer and of distillate at 17.5° 39.6 and 19.4, respectively. Tryptophan and tyrosine could not be detected, but positive evidence of the presence of vitamins-B and -C was obtained. For the measurement of $p_{\rm H}$ bromocresol-green was found very satisfactory when the beer H. J. DOWDEN. was diluted 1:9.

Wine distillates and wine brandies. H. ZELLNER (Z. Unters. Lebensm., 1930, 59, 431–433).—Mainly polemical against Büttner and Miermeister (cf. B., 1930, 527). H. J. Dowden.

[Wine distillates and wine brandies.] BÜTTNER and MIERMEISTER (Z. Unters. Lebensm., 1930, 59, 433— 434).—A reply to Zellner's criticism (cf. preceding abstract). H. J. DOWDEN. Standardisation and deterioration of rennin. L. D. HAVENHILL (J. Amer. Pharm. Assoc., 1930, 19, 720-724).—Examination of 10 specimens of rennin showed that deterioration had occurred to the extent of 60-99% during 17 years. Various recommendations regarding standardisation and storage of rennin are made. H. BURTON.

See also A., Aug., 1009, Rapid $p_{\rm H}$ determination [in beer and wort] (FLETCHER and WESTWOOD).

PATENTS. *

Nutritive media for cultivating pathogenic bacteria and preparation of vaccines therefrom. A. BECKER (B.P. 313,514, 17.1.29. Ger., 13.6.28).— The culture medium is prepared by adding a vegetable thickening agent such as agar to the undiluted vegetable juice obtained by expressing a vegetable substance rich in sugar and containing lævulose. For the manufacture of the vaccines, bacteria are grown on the medium at $37-40^{\circ}$ for from 2 to 20 hrs., according to the type of bacteria. The bacteria are washed off with sodium chloride solution with 0.5% of added phenol, killed by heating to $54-60^{\circ}$, and diluted as necessary.

C. RANKEN.

Manufacture of spirit and yeast by working-up molasses. F. SIMMER, Assr. to A./S. DANSK GAERINGS INDUSTRI (U.S.P. 1,774,406, 26.8.30. Appl., 13.1.28. Austr., 21.1.27).—See B.P. 283,969; B., 1929, 262.

Dehydration of impure ethyl alcohol. E. RICARD, Assr. to U.S. INDUSTRIAL ALCOHOL Co. (U.S.P. 1,763,722, 17.6.30. Appl., 20.11.25. Belg., 20.11.24).—See F.P. 614,913; B., 1927, 857.

XIX.—FOODS.

Elements in cereal grains. K. SCHMORL (Z. ges. Mühlenwesen, 1930, 6, 152—153, 167—169; Chem. Zentr., 1930, i, 1809).—The metal and non-metal content of the ash of rye shows greater differences than that of wheat. With increasing moistness during growth the content of phosphate, calcium, and potassium increases, whilst that of nitrogen decreases. In chalky soils the calcium content is increased, and the potassium content diminished. Clay soils increase the potassium and sulphate and diminish the calcium content. Sandy soils give the highest nitrogen content. No direct relation exists between the mineral content and the fertilisation. In comparison with the straw the grain contains more phosphorus and less silicon.

A. A. ELDRIDGE.

Detection of the age of flours. W. HARTMANN (Z. Unters. Lebensm., 1930, 59, 364—379).—An investigation has been made of the influence of storage on rye and wheat flours and grain. By the action of atmospheric nitrogen, moisture, and enzymes changes are produced in the fat extracted by light petroleum or chloroform resulting in a lowering of the refraction (at 40°) and an increase in the acidity as measured by titration with 0.5N- or N-caustic soda against phenolphthalein. During the first 7—8 weeks of storage a decrease in the lecithin-phosphoric acid content of the extracts was also detected, which thus accounts for the rapid fall in the refraction. The acidity of freshly-milled 60% rye flour was 54—76

CL. XIX.-Foods.

British Chemical Abetrace-15.

for commercial samples and 44 for an experimentally milled specimen, whilst for 60% wheat flour the corresponding values were 46—64 and 39, respectively. After storage for 6 months the values for 60% rye flour and 60% wheat flour were 120—150 and 90—100, respectively. It is considered that flours having acidities higher than the upper limits should be regarded as unserviceable. H. J. DOWDEN.

Composition of cows' milk in Finland. A. I. VIRTANEN (Milchwirt, Forsch., 1930, 9, 355—364; Chem. Zentr., 1930, i, 1869).—The low albumin $(3 \cdot 12\%)$ and high lactose $(4 \cdot 94\%)$ contents are characteristic. The albumin content is lowest in May and highest in September and October. With increase of albumin and fat the lactose decreases, and conversely. The calcium and phosphorus contents are practically constant. The variations are attributed to longcontinued stall feeding and lack of exercise.

A. A. ELDRIDGE.

Relation between the calcium content of Allgäu soils to the calcium content of milk and its coagulability by rennin. K. WURSTER (Milchwirt. Forsch., 1930, 9, 258—285; Chem. Zentr., 1930, i, 1869—1870).—The coagulability by rennin varied little; the feed and lactation conditions had no significant effect. Considerable variations in the calcium content are attributed chiefly to the conditions of lactation. The manner of combination, rather than the amount, of milk-calcium determines the behaviour towards rennin. A. A. ELDRIDGE.

Fodder and quality of milk in meadow fertilisation with calcium cyanamide. L. HERRMANN (Milchwirt. Forsch., 1929, 9, 142—160; Chem. Zentr., 1930, i, 1713).—Changes in the acidity, fat content, and density of the milk were observed. A. A. ELDRIDGE.

Effect of increasing doses of coconut and palmkernel cake on the fat content of milk. F. HONCAMP, W. HELMS, G. KÖDDER, and A. PETERMANN (Milchwirt. Forsch., 1929, 9, 161—178; Chem. Zentr., 1930, i, 1713). —The favourable effect, although proportionality does not exist, on the fat content and quantity of milk was confirmed. A. A. ELDRIDGE.

Fat in the fodder of milch cows. A. BUSCHMANN (Tierernähr., 1930, 1, 129—178; Chem. Zentr., 1930, i, 1962).—Up to 17.8% of the fat digested passes without marked change in composition into the milk. Moderate administration of fat usually has a favourable effect on the milk fat, but for each fat there is an upper limit of dose. A. A. ELDRIDGE.

Iodine [feeding] question. J. HANSEN (Tierernähr., 1929, 1, 119—124; Chem. Zentr., 1930, i, 1962).— Administration of "ancora" iodised salt to cows or sows was not followed by an increased milk yield or live weight. A. A. ELDRIDGE.

F.p. of milk from cows having foot-and-mouth disease. A. VAN RAALTE (Chem. Weekblad, 1930, 27, 480).—An analysis is given of the f.p. of 78 samples, which varied from -0.532° to -0.566° , the values being somewhat lower than that for normal milk.

S. I. LEVY.

Composition of "calciamolke" (whey). A. WASITZKY (Z. Unters. Lebensm., 1930, 59, 394–398).—

Whey prepared by the precipitation of casein with calcium lactate (4-5 g. per litre of milk) has been compared with wheys obtained by the treatment of milk with acetic acid and rennet. The results obtained with three samples of whole milk are tabulated, giving $p_{\rm H}$, density, total solids, fat, albumin, lactose, and ash, together with the percentage composition of the ash. The differences were very slight except in the case of the fat content, which was practically zero (0.0-0.02%) for the "calciamolke," but appreciable though small (0.02-0.27%) for the other two wheys.

H. J. DOWDEN.

Rapid determination of the bacterial content of meat products and sausages. F. W. BICKERT (Z. Unters. Lebensm., 1930, 59, 345-364).-The most suitable apparatus for disintegrating the product prior to its examination was found to be a ball-mill, using fused quartz sand as the abrasive and physiological saline as the medium. The best results were obtained when the proportions were 20 g. of sand, 80 c.c. of saline, and 20 g. of meat, the mixture being ground for 1 hr. at 120 r.p.m. at 0°. Various objections are cited against the plating-out methods of determining the bacterial content. A more rapid and accurate method is described in which the standard of comparison is a suspension of saprophytic spores which had been blackened by immersion in silver nitrate solution followed by pyrogallol. The suspension is mixed with the liquid under test in the proportion 1:9, the bacteria being then stained with carbol-fuchsin and a count made on a thin film of the mixture. H. J. DOWDEN.

Preservation of raspberry juice with hydrofluoric acid. R. COHN (Z. Unters. Lebensm., 1930, 59, 422-428).—A criticism of Hanak's statements (cf. B., 1930, 482). H. J. DOWDEN.

[Preservation of raspberry juice with hydrofluoric acid.] A. HANAK (Z. Unters. Lebensm., 1930, 59, 429–430).—A reply to Cohn's criticism (cf. preceding abstract). H. J. DOWDEN.

Toxicological aspect of the preservation of raspberry juice with hydrofluoric acid. E. DEUSSEN (Z. Unters. Lebensm., 1930, 59, 421-422).—A recapitulation of a publication on the toxicology of fluorine compounds (cf. Z. ges. richt. Med., 1923, 2, 141) with reference to Hanak's statement that small daily doses of hydrofluoric acid (0.006-0.009 g.) are cumulative and dangerous (cf. B., 1930, 482).

H. J. DOWDEN.

Formaldehyde titration of lemon juices. A. NIETHAMMER (Z. Unters. Lebensm., 1930, 59, 420).— When examined by the method of Tillmans and Kiesgen (cf. B., 1927, 456) natural and commercially prepared lemon juices were readily distinguishable.

H. J. DOWDEN.

Microchemical detection of [glucosidic] inclusions in certain fruits. A. NIETHAMMER (Z. Unters. Lebensm., 1930, 59, 418—419).—The inclusions in the flesh of *Mespilus germanica*, *Ceratonia siliqua*, and *Phænix dactylifera* have been isolated by sublimation under reduced pressure at 350°. The crystalline forms are characteristic of glucosidal tannins and the colour reactions with potash and with hydrochloric acid and vanillin gave positive results. Acetaldehyde and tannins were detected in the fruits. H. J. DOWDEN.

Ethylene oxide as a fumigant for food and other commodities. E. A. BACK, R. T. COTTON, and G. W. ELLINGTON (J. ECON. Entom., 1930, 23, 226-233). —Stored foodstuffs may be fumigated successfully with ethylene oxide alone or in conjunction with carbon dioxide. The mixture is non-inflammable and nonexplosive. Doses necessary for various materials are recorded and vary from 2-3 lb. of ethylene oxide per 1000 cub. ft. for 1-3 hrs., or, with 14 lb. of carbon dioxide, either the dose or the period of treatment may be reduced. (Cf. Cotton and Roark, B., 1928, 732.)

A. G. POLLARD.

Stalk treatment of fruit and vegetables for prevention of stalk rot, with special reference to bananas. R. G. TOMKINS and R. M. WOODMAN (J.S.C.I., 1930, 49, 285—287 T).—As a result of a number of trials of various substances for stem end treatment for the prevention of sta k rot, the use of paraffin wax, vaseline, and, possibly, boric acid crystals is recommended.

Mixer. ZAKARIAS.—See I. Cacao butter and its substitutes. AVENT. M.p. range of cacao butter. VAN ROON.—See XII. Carbon dioxide fumigation [against the flour beetle]. COTTON.—See XVI.

See also A., Aug., 1070, Beef extract as source of vitamin- B_2 (HOAGLAND and SNIDER).

PATENTS.

Butter manufacture. E. G. N. and (MRS.) E. S. SALENIUS (B.P. 333,233, 7.5.29).—Cream or whole milk is boiled at low temperature *in vacuo*, the agitation thus produced forming butter. Suitable apparatus is described. E. B. HUGHES.

Leavening of foodstuffs, india-rubber, and the like. E. O. WIIG (B.P. 311,389, 10.5.29. U.S., 10.5.28).-The mass to be leavened contains a ketonecarboxylic acid capable of decomposition by heat, with the aid of additional substances such as alkaline material if desired. For foodstuffs, acetonedicarboxylic acid is preferred because it is physiologically harmless and also gives rise only to carbon dioxide and acetone, the latter contributing to the leavening effect. This acid, if carefully prepared, can be kept for months with little decomposition. For use as a baking powder it is conveniently mixed with three times its weight of a starch product, e.g., flour or starch of rice or maize, the moisture content of which has been reduced below 10%. Such ketonecarboxylic acids can also be used for producing a cellular structure in other materials, e.g., in D. F. Twiss. rubber.

Pasteurisation or sterilisation processes and plants. A. GRAHAM-ENOCK, and GRAHAM-ENOCK MANUF. Co., LTD. (B.P. 332,949 and 332,950, 26.3.29).

Manufacture of biscuits. T. & T. VICARS, LTD., and E. M. CROSLAND (B.P. 333,158, 2.4.29).

Treatment of edible nuts [in the shell with dyes]. BENNETT DAY IMPORTING Co., INC., Assees. of H. C. GOOD (B.P. 315,398, 14.6.29. U.S., 13.7.28).

Food preservatives (B.P. 331,274).-See XXIII.

XX.-MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Reactions of sulphonal and trional. L. EKKERT (Pharm. Zentr., 1930, 71, 550).—Sulphonal may be distinguished from trional by the colour reactions with resorcinol and sulphuric acid, followed by dilution and addition of ammonia, the former giving a rose colour and the latter a trownish-yellow or yellow-brown.

S. I. LEVY.

Pharmacology of ergot : biological assay and standardisation. IX. Summary with conclusions and recommendations. M. R. THOMPSON (J. Amer. Pharm. Assoc., 1930, 19, 705-720; cf. B., 1930, 881). -When fluid extract of ergot (U.S.P. X) is freed from alcohol by evaporation in a vacuum, and the residue made up to the original volume by addition of saturated sodium hydrogen carbonate solution, the alkaloids are precipitated, whilst the non-specific amine fraction (mainly histamine) remains dissolved (cf. B., 1930, 639). The alkaloids are redissolved in dilute alcoholic hydrochloric acid. The various methods for the assay of ergot extracts are reviewed and the "isolated rabbit uterus method " is recommended as the official method. Ergotamine tartrate is suggested for use as a standard. Recommendations regarding storage of ergot and extracts are made. H. BURTON.

Infusum radicis ipecacuanhæ. K. H. BAUER and K. HEBER (Pharm. Zentr., 1930, 71, 513-518) .--Infusions of concentrations below 1:400, prepared by the method of D.A.B. VI, contain the bulk of the alkaloids present as determined in the original drug by the D.A.B. VI method (ammoniacal ether extraction). More concentrated infusions contain less of the original alkaloids; thus a 1:20 infusion contains only about one half. Concentration in vacuo of dilute infusions results in considerable decrease of alkaloid content. Decoctions prepared by the above method contain the same amounts of alkaloid as infusions of equal concentration, and prolonged treatment does not raise the yield in either case. When the residue from a concentrated infusion is again extracted, a further quantity of alkaloid is removed, but the total yield remains deficient. Infusion of such a residue with dilute hydrochloric acid brings the total yield almost to that indicated by the D.A.B. VI determination. Infusion of the original drug with dilute hydrochloric acid (2 g. with 40 c.c. of water and 10 c.c. of 0.5Nhydrochloric acid, followed by a second infusion with 50 c.c. of water) gives, however, higher values for the alkaloid content than the German official method, the figures from the latter representing only about 87% of the alkaloid present. The original drug, therefore, contains alkaloid in a form (possible glucosidic) that is removed neither by infusion nor by ammoniacal ether extraction. R. CHILD.

Decomposition of quinine on keeping or irradiating its aqueous solution. R. DIETZEL and K. SÖLLNER (Pharm. Ztg., 1930, 75, 955—957; cf. B., 1929, 147, 869; A., 1930, 795).—A 1% solution of quinine hydrochloride undergoes no change on keeping in diffused daylight for 1—2 days; on keeping for 60 days or after more than 5 hrs.' exposure to the radiation from a mercury-vapour lamp, the solution shows, besides

British Chemical Abstracts-B.	ish Chemicil Abstracts-B.	
966	CL. XXMEDICINAL SUBSTANCES : ESSENTIAL OILS.	

the development of colour, a decrease in its power of absorbing ultra-violet light, although no new bands appear in the absorption spectrum. At the same time the optical rotation decreases in value and the b.p. falls slightly (e.g., after 6 hrs.' irradiation the b.p. of a solution had fallen 0.09° and the optical rotation decreased from -177.4° to -168.9°). These changes, which are uninfluenced by passing oxygen through the solution during irradiation, are ascribed to polymerisation of the cinnamic-truxillic acid type involving the unsaturated linking in the vinyl group of the quinine molecule. Direct confirmation of this by a chemical method has not, however, yet been obtained.

R. CHILD.

Reactions of morphine and other opium alkaloids. L. EKKERT (Pharm. Zentr., 1930, 71, 550-551). —The colour reactions with *p*-dimethylaminobenzaldehyde and sulphuric acid are described. S. I. LEVY.

Analyses of chewing-tobacco. W. KOENIG (Z. Unters. Lebensm., 1930, 59, 407-411).-Determinations of moisture, ash, foreign inclusions, water-soluble extract, and nicotine have been made on 26 samples from 10 factories. Nicotine was determined by (a) a method using kieselguhr and tungstic acid, (b) Pfyl and Schmitt's method (cf. B., 1927, 955) and (c) a modification of the author's original method (cf. A., 1911, ii, 472). In (c), the sample (20 g.) is treated with 60 c.c. of 15% caustic soda and the mixture then extracted with 100 c.c. of xylene. After shaking and keeping for 24 hrs., the xylene solution is poured off, dried with anhydrous sodium sulphate, and filtered. A portion of the filtrate (75 c.c.) is shaken with 15 c.c. of 1N-sulphuric acid and, after separating and filtering the nicotine sulphate solution, 10 c.c. of it are shaken with 5 c.c. of 50% caustic soda and 25 c.c. of xylene. The xylene extract is separated, dried, and polarised. A table of factors is given for conversion of rotation into the percentage of nicotine. The tobaccos were also examined for artificial sweetening and preservative. The results showed wide variations. The averages of the three nicotine determinations, which agreed well, indicated nicotine contents of 1.9-4.8%. Adulteration with artificial sweetening and foreign vegetable materials was not detected, but traces of zinc and arsenic as well as boric and benzoic acids were noted in several samples. The considerable loss on drying (max. 22%) and the high mineral content (max. 3%) gave rise to serious criticism. H. J. DOWDEN.

Microchemistry in the domain of essential oils and perfumery material. L. ROSENTHALER (Perf. and Essent. Oil Rec., 1930, 21, 277—286).—A review. Details are given, with descriptions of apparatus, for the microchemical examination of such raw materials as benzoin, peru and tolu balsams, storax, camphor, valerian root, nutmeg and mace, cloves, tonquin beans, cinnamon, and aniseed; for the identification of pure compounds, including benzaldehyde, bourbonal, menthol, piperonal, and thymol; for the examination of essential oils, and for the detection of such adulterants as nitrobenzene in benzaldehyde, and coumarin in vanillin. The microdetermination of hydrogen cyanide is also described. R. CHILD,

Bacteriological chemistry of heavy metals.

E. A. COOPER and S. D. NICHOLAS (J.S.C.I., 1930, 49, 386-388 T).-Cadmium compounds are actively germicidal, being more potent than lead salts, but less so than mercury salts. The soluble complex pyrophosphates of sodium with cadmium and bivalent mercury are strongly inhibitory to bacteria. The mercurous compound is active in concentrations of 1 in 1,000,000, and the cadmium derivative in 1 in 10,000. Inhibitory power has been measured by studying the effect of the germicides on (a) rate of bacterial growth and (b) rate of dissolved oxygen absorption. In certain cases metallic compounds have been found to exert a stimulating effect on bacteria. Methods are also described for the preparation of colloidal solutions of cadmium compounds. Cadmium carbonate produces a very stable sol, but the phosphate and molybdate are unstable. In the case of lead, however, the sols of the phosphate and molybdate are extremely stable.

Mixer. ZAKARIAS.—See I. Nitrous oxide for anæsthesia. HENDERSON and LUCAS.—See VII. Diffusion of kaolin and insoluble carbonates. RAE.—See VIII.

See also A., Aug., 1031, Phenylurethane anæsthetics (RIDER). 1046, Preparation of aminoalcohols, derivatives of atophan, carbostyril, and of quinoline, and arsenicals (FOURNEAU and others). 1047, Synthesis of isomerides of proflavine and neutral acriflavine (BOGERT and others). Dialkylbarbituric acids (SHONLE and others). 1050, Alkaloids of ergot (SMITH and TIMMIS). 1053, Reactions of adrenaline and novocaine (EKKERT). Specific colour reactions of adrenaline and tyrosine (KISCH).

PATENTS.

Methylenedisalicylic acid derivatives. S. L. SUMMERS (U.S.P. 1,743,630-6, 14.1.30. Appl., [A-F] 12.10.28, [G] 8.12.28).-Methylenedisalicylic acid is converted by way of an ester into the amide. (A) The amide is etherified with a nitrobenzyl chloride, the nitro-groups are reduced, and the product, after being heated with pyruvic acid in alcohol at 130° to introduce two pyruvyl groups into the two amide groups, is diethylated to give the compound $CH_2[C_6H_3(O \cdot CH_2 \cdot C_6H_4 \cdot NHEt) \cdot CO \cdot NH \cdot CO \cdot COMe]_2.$ (B) The amide is converted into O-acyl derivatives, e.g., by heating with pyruvic or acetic acid and sulphuric acid. (c) The amide is etherified with a nitrobenzyl chloride, the nitro-groups are reduced, and the product is tetrapyruvylated or (D) tetra-acetylated. (E) The amide is converted into its O-diacetate, which is then diiodinated. (F) The amide is converted into its NN'dibenzylidene derivative, which is di-iodinated, or is dipyruvylated and di-iodinated. (G) The amide is diiodinated. All the products have antirheumatic and antiseptic properties. C. HOLLINS.

Manufacture of guanidine derivatives. Soc. CHEM. IND. IN BASLE (B.P. 316,195, 24.7.29. Switz., 24.7.28).—Compounds containing a heterocyclic NH group react with cyanamide to give guanyl derivatives. Examples are guanyl derivatives of α -pipecoline (hydrochloride, m.p. 190—192°), ethyl *p*-nipecotylaminobenzoate [hydrochloride, m.p. 116° (decomp.); piorate, m.p. 226°], tetrahydroquinaldine (hydrochloride, m.p. 184—185°; nitrate, m.p. 179°), *d*-coniine (nitrate, m.p. 154—155°), piperidine (hydrochloride, m.p. 184°), stilbazoline, 2:4:6-trimethylpiperidine (nitrate, m.p. 160—162°), ethyl 2:4:6-trimethylpiperidine-3:5dicarboxylate (nitrate, m.p. 162°), nipecotyldiethylamine, nipecotylethyl-*n*-butylamide, nipecotyl- β -phenylethylamine, nipecotyl-4-o-anisoxyaniline, and decahydroquinaldine (hydrochloride, m.p. 242°). C. HOLLINS.

Organic arsenic compounds. [SIR] G. C. MARKS. From PARKE, DAVIS, & Co. (B.P. 331,195, 22.12.28).— Arylarsinic acids are warmed in water with salts of carboxylic acids containing a thiol group. The products, $Ar \cdot As(S \cdot R \cdot CO_2Na)_4$, or $Ar \cdot AsO(S \cdot R \cdot CO_2Na)_2$, or $Ar \cdot AsO(ONa)(S \cdot R \cdot CO_2Na)$, are valuable against spirochætes and trypanosomes. Sodium thioglycollate is condensed with 3-amino-4-hydroxybenzenearsinic acid, with phenylglycineamide-4-arsinic acid, and 3-nitro-4hydroxybenzenearsinic acid; cysteine with arsanilic acid, and phenylglycinamide-4-arsinic acid.

C. HOLLINS.

Manufacture of salts of antimonic acid and of organo-stibinic acids. I. G. FARBENIND. A.-G. (B.P. 309,184, 5.4.29. Ger., 7.4.28. Addn. to B.P. 311,448; B., 1929, 577).—The salts of p-aminobenzenestibinic acid with primary or tertiary amines, diamines, etc. are therapeutically valuable, as also are amine salts generally of antimonic acid. Diethylamine antimonate, diethylamine 3-chloro-4-acetamidobenzenestibinate, ethylenediamine p-aminobenzenestibinate, and quinine p-acetamidobenzenestibinate are described. C. HOLLINS.

Isolation of certain physiologically active substances. C. FUNK (U.S.P. 1,745,788, 4.2.30. Appl., 4.1.27. Ger., 15.1.26).—Picric, picrolonic, and flavianic acids, and other analogous nitrophenols, are used as precipitants, *e.g.*, in the purification of insulin, and isolation of the hormone of the posterior lobe of the pituitary gland, vitamins-*B*, -*C*, and -*D*, etc.

C. HOLLINS.

Separation of α -terpineol from pine oil. L. T. SMITH, Assr. to HERCULES POWDER CO. (U.S.P. 1,743,403, 14.1.30. Appl., 11.8.27).—Pine oil is fractionated, preferably under reduced pressure, and the fraction, b.p. 214—220°, is cooled to -15° and seeded. C. HOLLINS.

Manufacture of derivatives of quinoline [atophan]. R. WOLFFENSTEIN (U.S.P. 1,773,837, 26.8.30. Appl., 10.1.29. Ger., 23.1.28).—See B.P. 304,655; B., 1929, 835.

Drying of tobacco. "Universelle" CIGARETTEN-MASCHINEN-FABR. J. C. MÜLLER & Co., and C. W. MÜLLER (B.P. 333,416, 4.9.29).

Magnesium hydroxide tablets (B.P. 310,919).— See VII. Dental cement (B.P. 333,325).—See IX. Vaccines (B.P. 313,514).—See XVIII.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

See also A., Aug., 1005, Colour-selectivity of latent photographic images (WEIGERT and SHIDEI).

PATENTS.

Production of diazo-types. KALLE & Co. A.-G. (B.P. 331,459, 19.10.29. Ger., 19.10.28).—Hydroxyarylguanidines or -diguanidines having a free position o- or p- to the hydroxyl group are used as coupling components in diazo-type processes. Examples are: 7-hydroxy-1-naphthyldiguanidine with diazotised p-aminodimethylaniline (blue) or tetrazotised tetramethoxybenzidine (blue); 7-hydroxy-2-naphthyldiguanidine with diazotised 4-amino-4'-methoxydiphenylamine (reddish-brown). C. HOLLINS.

Packing for photographic plates. I. G. FARBENIND. A.-G. (B.P. 333,864, 14.3.30. Appl., 16.3.29).

XXII.—EXPLOSIVES; MATCHES.

PATENTS.

Methods of influencing the combustion of ignition compositions, explosives, etc. A. J. STEPHENS. From ASOCIACION DE PRODUCTORES DE YODO DE CHILE (B.P. 333,364, 11.7.29).—The addition of iodine or oxygen-free compounds of iodine, such as cuprous iodide, to match-head compositions, explosives, and flash-light powders, and to rubbing surfaces for matches, promotes uniform combustion without explosion. The use of 5% of cuprous iodide in rubbing surfaces permits a reduction in the proportion of red phosphorus from 50 to 10%. W. J. WRIGHT.

Denitrating "mixed" acid (B.P. 333,264).— See VII.

XXIII.—SANITATION; WATER PURIFICATION.

Hygienic evaluation of surface water. O. ACKLIN (Gas- u. Wasserfach, 1930, 73, 409—416).—From numerous examples it is shown that a satisfactory hygienic evaluation of a water may be obtained by determining the ratios non-volatile residue/total nitrogen as ammonia and total oxygen/oxygen consumption after keeping for 5 days, both ratios being measured immediately after filtration of the water through a sand filter. Simultaneous high values for both ratios indicate a thoroughly satisfactory water for domestic consumption. A. R. POWELL.

Determination of ammonia in water. M. W. E. EVERS (Chem. Weekblad, 1930, 27, 475-480).—The limit of HCO_3 concentration below which it is necessary to add alkali in order to ensure the removal of all ammonia by distillation is experimentally determined as 46 mg. per litre; when more than this is present, all the ammonia is driven off, the ratio of calcium to magnesium having no influence. Calcium carbonate is the most suitable material for the addition, but objections urged against the use of magnesia and sodium carbonate are shown to be unfounded. S. I. LEVY.

Testing of river water by determination of the permanganate demand and the chlorine number. A. BEHRE, H. CHRISTLIEB, and M. KONGEHL (Z. Unters. Lebensm., 1930, **59**, 398—402).—In an attempt to determine the cause of the unpleasant taste of the Hamburg water supply during the winter months, samples were taken at three stations over a period of 9 months and subjected to the permanganate test and Froboese's chlorine test (cf. Arb. Reichsges.-Amt., 1920, **52**, 211). During the summer months the chlorine value was 33—50% lower than the permanganate demand, but during December—March the former often exceeded the latter, thus indicating the presence of protein matter. The figures support the view that pollution is being caused by sewage, especially as the beet-sugar factories are not in operation during the period when the water is most contaminated. The cold chlorination to which the water supplies are subjected does not affect the values given by the tests; bacteria are destroyed, but organic matter is not attacked (cf. Keiser, B., 1926, 222).

H. J. DOWDEN.

Purification of drinking water by slow sand filtration. H. DORNEDDEN (Gas- u. Wasserfach, 1930, 73, 289-294, 319-325, 340-343).-Laboratory and large-scale tests on the comparative filtering properties of quartz sand and graded basaltic lava are described in detail. Although the lava filters were somewhat more retentive of bacterial slime, they did not behave so satisfactorily as the sand filters under conditions which were continually varying. Again, the lava grains had a decided tendency to break up during mechanical purification, so that re-grading was necessary before the lava could be used again; this more than com-pensated for the longer life of the lava filter beds. Examples are given of the composition of the filtrate and of the deposited slime after filtration of various waters through sand and lava filters, and the effects of pore size, rate of filtration, temperature, and pressure on the filtration processes are discussed.

A. R. POWELL.

Electro-osmose treatment of boiler waters. E. BARTOW (J. Amer. Water Works' Assoc., 1930, 22, 1115-1121).-The electro-osmose process (cf. B., 1927, 958) gives a water which is equivalent to distilled water for steam-raising purposes. Tap water 'and zeolite-softened water are equally suitable for use as the raw water; practically all dissolved solids are removed except a trace of organic matter and a little silica which is thought to be present in the molecular rather than in the ionic form and to be possibly of colloidal size. A partly-purified water containing a total residue of approx. 65 mg./litre can be obtained at an operating cost which compares favourably with a barium carbonate-calcium hydroxide treatment operating at the same rate. The cathode wash-water, which contains hydroxide, may be used industrially in any process where lime water is used. The anode water can be used as a bleaching or disinfecting wash-water. The removal of the first 50% of the dissolved solids can be accomplished at one third the cost of complete removal. C. JEPSON.

See also A., Aug., 1020, Preparation and bactericidal properties of penta-, hepta-, and nona-decoic acids (GREER and ADAMS).

PATENTS.

Manufacture of materials resistant to or active against micro-organisms [food preservatives and disinfectants]. A. CARPMAEL. From T. SABALITSCHKA (B.P. 331,274, 28.3.29).—The *m*- or *p*-hydroxybenzoic esters of alcohols having 2 or more carbon atoms (ethyl, propyl, benzyl) are added to fruit juice, gelatin, or other material liable to bacterial decomposition. Mixtures of the esters are especially effective; *e.g.*, a mixture of 0.045% of ethyl ester and 0.035% of *n*-propyl ester added to fruit pulp permanently prevents attack by mould or yeast. C. HOLLINS. Disinfectant, antiseptic, and germicidal products. J. M. SCHAFFER (U.S.P. 1,745,507-8, 4.2.30. Appl., [A] 11.10.28, [B] 20.10.28).-(A) The use of *C*-acylated resorcinols, *e.g.*, acetyl, propionyl, butyryl, valeryl, hexoyl, heptoyl, and octoyl derivatives, and (B) *C*-amyland/or *C*-hexyl-phenols, is claimed. C. HOLLINS.

Insecticides. (SIR) G. C. MARKS. From ROHM & HAAS CO. (B.P. 330,911, 13.12.28).—Chloroacetic acid derivatives having a vapour pressure lower than that of the butyl ester are non-lachrymatory and at considerable dilution kill flies, aphis, Japanese beetle, cockroaches, etc. Glycerol tri(chloroacetate), cyclohexyl chloroacetate, glycol di(chloroacetate), sodium chloroacetate, 2 : 3-dichlorophenacyl chloride, chloroacetamide, dichloroisopropyl chloroacetate (b.p. 133—135°), and nitrophenyl chloromethyl ketone are specially mentioned. C. HOLLINS.

Preventing the formation of scums and films due to growth of organisms on surfaces in contact with water. J. C. BAKER, ASST. to WALLACE & TIERNAN PRODUCTS, INC. (U.S.P. 1,745,141, 28.1.30. Appl., 21.7.27. Renewed 14.11.29).—The formation of such slimes, in condensers and similar surfaces in contact with running water, may be prevented by the intermittent addition to the water of chlorine in sufficient quantity to leave a small residuum. C. JEPSON.

Chlorinating apparatus [for water]. W. C. BLACKMOND (U.S.P. 1,752,723, 1.4.30. Appl., 29.3.29).— A closing apparatus for chlorine is described in which a definite volume of gas is released periodically by means of a pulsating device. The period required to complete a cycle of operations is claimed to be under easy control and the whole apparatus simple in operation and unlikely to develop leaks. C. JEPSON.

Water softener. W. N. MCCONKEY (U.S.P. 1,753,661, 8.4.30. Appl., 24.9.27).—A mixture consisting of a colloidal suspension of aluminium hydroxide (5-10%), caustic soda (20-30%), trisodium phosphate (5-10%), soda alum (1-2%), and glycerin or castor oil (1-2%) is claimed as an efficient agent for purifying and softening water for many industrial and domestic uses.

C. JEPSON. Deodorising, disinfecting, or preserving organic or offensive matter and production of fertilisers therefrom. FIDASCO, LTD., and W. H. HASLAM (B.P. 331,546, 2.4.29).—Dried pulverised common seaweed is claimed to be a suitable medium for packing and preserving fresh fish, fruit, etc., for use as an absorbent or partial drying agent, and for the production of a stable and inoffensive fertiliser when mixed with fish offal and subsequently dried and powdered. C. JEPSON.

Production of antiseptic agents. H. WIELAND, Assr. to C. H. BOEHRINGER SOHN CHEM. FABR. (U.S.P. 1,772,975, 12.8.30. Appl., 14.6.26. Ger., 20.6.25).— See B.P. 253,918; B., 1927, 894.

Filtration material for gas masks [from fibrous material and activated charcoal]. V. HORÁK (B.P. 309,914, 15.4.29. Austr., 17.4.28).

Filter insertions for respirators [from activated carbonaceous felt]. V. Horák (B.P. 307,835, 12.3.29. Czech., 14.3.28).

Filtering material (U.S.P. 1,734,197).-See VII.