

BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JUNE 3, 1932.



I.—GENERAL; PLANT; MACHINERY.

Solid matter in boiler-water foaming. I. Experiments at atmospheric pressure. C. W. FOULK and V. L. HANSLEY (Ind. Eng. Chem., 1932, 24, 277—281).—No foam was produced when H_2O containing $NaCl$ 4000 p.p.m. and solids in suspension < 1000 p.p.m. was boiled, but boiler scale at 2000 p.p.m., ground limestone at 3000 p.p.m., or $CaCO_3$ [from boiling aq. $Ca(HCO_3)_2$] at 3000 p.p.m. caused foaming, the depth of foam increasing with increasing concn. of the suspended matter. Finely-ground flint, clay, and highly purified $CaCO_3$ produced no foam at concns. up to 4000 p.p.m. (greater concns. were not tried). Boiler scale from which a little oil had been extracted caused less foaming than the untreated scale. H_2O containing Na_2SO_4 4000 p.p.m. and $CaSO_4$ 4000 p.p.m. did not cause foaming. Boiler scale at concns. of 5000 p.p.m. in H_2O containing 8000 p.p.m. of Na_2SO_4 produced foaming, but after boiling for a few hr., during which the concn. was kept const., it lost its foam-producing property; ground limestone and dolomite behaved similarly. The surface tension of H_2O was lowered by a continuous layer of powdered boiler scale or $CaCO_3$ [from $Ca(HCO_3)_2$] on the surface, and also by the presence of traces of engine or paraffin oil if the concn. of the surface constituents was increased by confining them to a smaller area by means of a straight edge. Ground flint has no such effect unless it has been contaminated with petroleum oil. Finely-divided boiler scale on the surface of H_2O or aq. solution in a continuous layer produces a plastic solid effect. A little castor oil destroys this effect and prevents foaming on boiling. D. K. MOORE.

Deposits on the steam side of evaporator tubes. H. J. SPOELSTRA (Arch. Suikerind. Nederl.-Indië, 1931, III, No. 23).—First-effect tubes having a slight deposit of oil on them from the heating steam showed a higher heat transmission than did the original clean tubes, but on removing the oil by benzine this high transmission was distinctly lowered. It is assumed that the favourable action of the oil on the heat transmission is due to its favouring the condensation of the steam in the form of drops rather than as a film. A rough surface is not as favourable as a smooth one to heat transmission, and the question of making evaporator tubes of non-corroding metal is thought worthy of consideration.

J. P. OGILVIE.

The "Jenkins" vertical dryer. B. HEASTIE (Internat. Sugar J., 1932, 34, 99—100).—It consists essentially of a cylindrical shell made of mild steel, containing a central rotating shaft to which a no. of metal dishes are attached. A corresponding no. of metal cones are fitted to the shell, the inner diam. of these being slightly larger

than the dishes, so that the unit can be easily erected. Sugar fed in at the top falls upon the topmost dish, and is flung by centrifugal force against the cone, from which the crystals fall by gravity to the next dish, and so on. Scrapers are provided on the 5 upper cones. Economy of time, steam, and power is claimed for this apparatus, besides which the crystals are less subject to attrition, and less liable to have their lustre impaired, compared with the horizontal type of dryer. J. P. OGILVIE.

Drying of solids. IV. Application of diffusion equations. T. K. SHERWOOD (Ind. Eng. Chem., 1932, 24, 307—310; cf. B., 1930, 552).—An equation derived for the const. rate of drying of an infinite slab shows that the moisture-gradient curve approaches a parabolic form, and this conclusion is confirmed by experimental results. An equation is derived for the moisture content of the slab during the period when the rate of drying is controlled by the rate of diffusion of the liquid after a period of drying at a const. rate and its applicability to experimental results is discussed. D. K. MOORE.

Tower-absorption coefficients. IV. L. M. BENNETCH and C. W. SIMMONS (Ind. Eng. Chem., 1932, 24, 301—303; cf. B., 1930, 801).—An equation for the tower-absorption coeff. introducing the ratio of the mol. quantities of gas and liquid and the free vol. of the tower is derived for systems obeying Henry's or Raoult's law with a non-volatile liquid and its applicability is experimentally confirmed. D. K. MOORE.

Measurement of the flow of gases and vapours. B. F. DODGE (Ind. Eng. Chem., 1932, 24, 261—273).—A comprehensive review of gas flow-meters.

D. K. MOORE.

Concept of brittleness. F. W. PRESTON (J. Amer. Ceram. Soc., 1932, 15, 176—178).—A brittle substance must fail in tension and not in shear, have a high elastic modulus, have a fairly high tensile strength, and be capable of developing forked fractures from internal stress. These conditions differentiate the really brittle substances such as glass and quartz. J. A. SUGDEN.

PATENTS.

Retorts, furnaces, kilns. R. NISBET (B.P. 368,427, 17. and 31.12.30).—A moving endless chain feeds metal containers filled with the material (*e.g.*, coal or other carbonaceous substance to be distilled, or metal to be heat-treated) into an inclined elongated metal retort provided with offtake pipes and heated over the sides and bottom by transversely disposed heating flues, collects and empties the containers by inverting them, and recirculates them. The chain moves in a tunnel below the retort and is actuated by sprockets mounted in gas-tight chambers enclosing the ends of the retort and tunnel.

Means are provided for filling the moving containers from a hopper, for cooling and collecting the discharged solid product, and for replacing one or more containers.

H. E. BLAYDEN.

Furnaces. SOC. OXYTHERMIQUE, Assees. of M. FRANKL (B.P. 369,931, 22.12.30. Ger., 9.1.30).—A smelting furnace is operated with a gas substantially free from CO_2 by circulating the gas between it and a gas heater operated alternately by hot- and cold-blow similarly to a water-gas producer, but without the H_2O . The waste gases from the hot-blow are burned to CO_2 in a regenerator the heat of which is used to preheat the air for the next hot-blow, the regenerator and gas heater being in duplicate. By this means the temp. of the air from the regenerator may be 800° , the coke at the end of the hot-blow 1700° , and the gases leaving the coke during the cold-blow and going to the smelting furnace 1500° . If the last temp. is insufficient to effect smelting it may be raised by the addition of a small quantity of O_2 to the shaft furnace, to the heated gases, or to the gas heater, with or without the addition of coal dust. A hearth furnace for oxidising refining may be combined with the shaft furnace and the former operated with O_2 (and coal dust), the gases from it going to the circuit for the latter. B. M. VENABLES.

Ovens for the firing of pottery and enamel goods, for the heat treatment of metals, and for other purposes. GIBBONS BROTHERS, LTD., and M. VAN MARLE (B.P. 370,087, 28.1.31).—The articles are conveyed by both runs, in adjacent courses, of a continuous chain-conveyor through a furnace which is partly horizontal and partly vertical, only the latter branch being heated. In the horizontal portion the ingoing goods are above the outgoing and are thus efficiently preheated. B. M. VENABLES.

Drying of materials. SALT UNION, LTD., and R. BENNET (B.P. 368,395, 24.4.31).—The material (especially solid granular materials, *e.g.*, NaCl) falls down a tower in steps, being directed towards the axis by fixed guides and centrifugally sprayed in thin layers by discs on a vertical shaft. The discs are concave on the upper face, their concavity increasing in progression down the tower. B. M. VENABLES.

Dryer control. C. D. DE MERS, Assr. to TAYLOR INSTRUMENT COMPANIES (U.S.P. 1,815,648, 21.7.31. Appl., 24.7.30).—A minor current of separately conditioned air is caused to aspirate samples of the air in the dryer from several different points, and the condition of this average sample controls the main circulation of drying air. B. M. VENABLES.

Straining arrangements for vacuum drying apparatus. A. E. JONSSON (B.P. 369,144, 5.9.31. Swed., 25.9.30).—A straining device for vapours etc. drawn off from a vac. drum is situated within the drum and is arranged to be self-cleaning on rotation of the drum, by means of fingers extending into the slots. B. M. VENABLES.

Tubular heat exchangers particularly applicable to cooling [compressed] gases. W. W. TRIGGS. From INGERSOLL-RAND Co. (B.P. 368,600, 16.5.31).—The cooling liquid passes through a bundle of tubes

threaded through baffles which cause the outer fluid to flow zig-zag transversely to the tubes. Turbulence of the outer fluid is produced by smaller flows along the surface of the tubes through extensions of the holes in the baffles provided for the purpose. B. M. VENABLES.

Protecting against corrosion the surfaces of heat-exchanger parts exposed to water and steam. SUPERHEATER Co., LTD. From B. BLOCK (B.P. 368,619, 6.6.31).—Before putting the apparatus into use it is heated when filled with a solution of H_2SiO_3 .

B. M. VENABLES.

Apparatus for automatic control of temperature, pressure, or other physical condition. BAKELITE, LTD., and L. W. MULLINGER (B.P. 370,062, 7.1.31).—A bimetallic element or any other device capable of recording the desired physical quantity operates a pointer moving over a revolving dial such as is usual in recording instruments, but instead of a stylus the pointer carries an electrical contact completing, through the conducting dial, the circuit of a feeble primary current. A graph of the desired treatment, *e.g.*, time-temp., is sketched on the dial, and the space outside the line is coated with insulating varnish. If now the primary current is caused to control the heating means through a relay the pointer will follow the graph.

B. M. VENABLES.

Lubricating and sealing fluid [for use in refrigerator compressors]. F. C. NONAMAKER, Assr. to WELSBACH Co. (U.S.P. 1,822,449, 8.9.31. Appl., 9.3.27).— $\text{Na}_2\text{S}_2\text{O}_3$ is added to a glycerin-glycol lubricant to reduce oxidation. L. A. COLES.

Utilisation of impure vapours and gases for heating water and other fluids. C. ROSENBLAD (B.P. 368,925, 27.1.31. Swed., 27.1.30).—The indirect heat transmission from gases of moderate temp. being poor, the gases from which the heat is to be recovered are passed in direct contact with a liquid, *e.g.*, water in a jet condenser, of which the quantity is so regulated that its temp. is raised to just below its b.p. This liquid, after storage, if desired, in an accumulator, gives up its heat to a clean liquid in a surface-type heat exchanger, and may be returned for re-use. Alternatively, waste water at a moderate temp. from another source may be used. B. M. VENABLES.

Fire-extinguishing fluids. R. H. SANSOME (B.P. 369,003, 25.3.31).—The fluid comprises 60–90% by wt. of MeBr and 40–10% of C_2HCl_5 ; compressed N_2 is used as propellant. L. A. COLES.

Production of foam for fire-extinguishing purposes. R. A. BLAKEBOROUGH and W. R. GARRATT (B.P. 369,012, 30.3.31).—A fatty acid (stearic, palmitic, or oleic acid) or a soap is added to the acid or basic solution used for producing the foam. L. A. COLES.

Working substance [refrigerant medium] for producing heat-transforming effects. R. W. DAVENPORT, Assr. to CHICAGO PNEUMATIC TOOL Co. (U.S.P. 1,818,117, 11.8.31. Appl., 23.2.27).—A liquid for use in refrigerators comprises a mixture of $\text{C}_2\text{H}_2\text{Cl}_2$ and 6% of CCl_4 . L. A. COLES.

Anti-freezing liquids [for motor radiators]. O. P. GREENSTREET (B.P. 367,504, 29.12.30).—The liquid

consists of 10—20 pts. by vol. of kerosene which has been boiled for 30—60 min. and 1 pt. of oil of mirbane.

D. K. MOORE.

Manufacture of ice. H. A. J. MACPHERSON (B.P. 369,143, 4.9.31).—The heat in the freshly compressed air (which will be used for agitation) is used to thaw the ice blocks.

B. M. VENABLES.

Apparatus for kibbling or reducing [soft] lump material. J. M. FLEMING and W. H. BARNES (B.P. 369,034, 21.4.31).—A kibbler for materials such as dye-stuffs and soap, comprising a rotary disc through the perforations of which the material is pressed by an inclined plate, has the latter yieldingly mounted to prevent damage by accidental hard pieces.

B. M. VENABLES.

Pulverising machines. A. A. HOLBECK (B.P. 368,106, 8.4.31).—Though the initial entrance may be near the axis, the material enters the pulverising chamber at the periphery and the fine material is drawn through against centrifugal force by a fan. Preferably there are two pulverising elements rotating in opposite directions, the fan being on the same shaft as one and the feeder on the same shaft as the other.

B. M. VENABLES.

Pulverising apparatus. BRIT. JEFFREY-DIAMOND, LTD. FROM JEFFREY MANUF. CO. (B.P. 368,614, 1.6.31).—A form of beater for a disintegrator is described.

B. M. VENABLES.

Apparatus for reducing to fine powder various materials and products such as enamels. J. L. M. THOMAS (U.S.P. 1,810,800, 16.6.31. Appl., 15.5.30. Fr., 18.5.29).—The apparatus comprises an anvil in the centre of a conical sieve and a pestle which is hollow and supplied with compressed air to force the powdered material through the sieve.

B. M. VENABLES.

Attrition mill. R. LEE, ASSR. to LEE ENG. RES. CORP. (U.S.P. 1,816,050, 28.7.31. Appl., 8.4.27).—A mill especially suitable for the production of whole-wheat flour in restaurants etc. is described.

B. M. VENABLES.

Grinding mills. J. VÖGELE A.-G., and W. KÖHLER (B.P. 370,291, 27.7.31).—A primary roller engages first with a secondary roll (*A*) and then with a grinding block (*B*) which is situated so close to *A* that material which is too coarse to pass under *B* is returned by *A* to the original point of entry.

B. M. VENABLES.

[Hand-operated] mortar. J. H. FRYDLENDER (B.P. 370,285, 17.7.31. Fr., 19.7.30).—The mortar has a wider base than usual and is so shaped that the pestle may be reciprocated.

B. M. VENABLES.

[Feeding device for] grinder. R. PRATER (U.S.P. 1,815,326, 21.7.31. Appl., 21.8.29).—A grinder for cattle feed etc. has the outlet of the hopper controlled by two slides so arranged that a slow feed can be obtained through a wide passage.

B. M. VENABLES.

Mixing apparatus. H. S. BEERS, ASSR. to TURBO-MIXER CORP. (U.S.P. 1,816,562, 28.7.31. Appl., 10.1.30).—An arrangement of annular flow-directing plates and stationary deflector in a turbo-mixer is described.

B. M. VENABLES.

Mixing devices. P. LECHLER (B.P. 370,154, 9.3.31. Ger., 22.4.30).—Two fluids (which term includes fine

powders) are injected tangentially into one or more cylindrical chambers, and the mixture leaves axially, preferably direct into a tangential inlet of a similar chamber.

B. M. VENABLES.

Homogenising or emulsifying apparatus or the like. DUSSEK BITUMEN CO., LTD., and E. R. HATT (B.P. 368,719, 8.12.30).—In an apparatus of the shearing type, the working surfaces are, e.g., parabolic and the clearance is arranged to become smaller in the direction of flow of the liquids; the clearance is also adjustable, preferably by axial adjustment of the parts of a double rotor.

B. M. VENABLES.

Centrifugal machines. GUTEHOFFNUNGSHÜTTE OBERHAUSEN A.-G. (B.P. 368,618, 4.6.31. Ger., 14.8.30).—A basket- or bowl-type centrifuge is provided with a disc which is reciprocated slowly within the bowl, the feed being supplied to the lower side of the disc when it is rising, and *vice versa*. The partly dried material is pushed by the disc to the ends of the bowl where, on a sloping part, drying is completed during a double stroke of the disc pending the arrival of a fresh lot of partly dried material which pushes the completely dried material off.

B. M. VENABLES.

Centrifugal machines. G. TER MEER (B.P. 369,107, 30.6.31).—In a straining-type centrifuge in which the solid matter is removed by the reciprocation of a scraper plunger, the latter is formed hollow and forms a preliminary dehydration chamber for the feed so that the material becomes of sufficient consistency to prevent unaided flow out of the apparatus in a sloppy condition.

B. M. VENABLES.

Centrifugal machine. H. H. STEPHENS and J. L. HARING (U.S.P. 1,815,934, 28.7.31. Appl., 27.2.30).—A direct-coupled, under-driven type of machine is described.

B. M. VENABLES.

Centrifugal bowls. AKTIEB. SEPARATOR (B.P. 368,670, 17.9.31. Swed., 25.9.30. Addn. to B.P. 360,189; B., 1932, 132).—A form of central feed-tube and channel is described.

B. M. VENABLES.

Centrifugal separator with closed inlet or outlet for liquid. AKTIEB. SEPARATOR (B.P. 368,980, 6.3.31. Swed., 8.11.30).—Flexible fluid-tight joints between the rotating parts and the non-rotating conduits are described.

B. M. VENABLES.

Extracting and filtering apparatus. P. L. FAUTH GES.M.B.H. (B.P. 370,346, 23.10.31. Ger., 14.11.30).—Filter pockets are placed between heating pockets on some of the walls of a container of which another wall is occupied by a door. A heating jacket is also provided. Separate outlets are provided for original filtrate and residual liquid solvent, the last-mentioned being finally removed by heat. The apparatus is suitable for oil containing fuller's earth.

B. M. VENABLES.

Filtering systems. A. E. WHITE. FROM MOTOR IMPROVEMENTS, INC. (B.P. 369,953, 19.9.30).—A filter, e.g., for the lubricating oil of a motor-car engine, is described.

B. M. VENABLES.

Filters. DOOLEY IMPROVEMENTS, INC. (B.P. 368,290, 26.9.30. U.S., 17.10.29).—The filter (for fuel oil etc.) comprises a fabric bag maintained in deeply fluted form by a number of star-shaped discs.

B. M. VENABLES.

Liquid-purification system. C. C. REYNOLDS (U.S.P. 1,810,789, 16.6.31. Appl., 13.2.30).—An arrangement of tanks and washers, especially suitable for treatment of gasoline used in a dry-cleaning plant, is described. B. M. VENABLES.

Automatic apparatus for controlling a physical condition such as the temperature of a circulating fluid. J. L. HODGSON, A. IVANOV, and G. P. E. HOWARD (B.P. 368,273, 29.8.30).—A temp. or pressure is automatically controlled by two means which are, respectively, sensitive to the difference of temp. or pressure from the normal and to the rate of change of temp. or pressure. *E.g.*, if the temp. is low and falling, both means will operate to increase the supply of heat; when, in consequence, the temp. starts rising the second means operates to reduce the supply of heat, leaving only a small net supply. B. M. VENABLES.

Apparatus for treatment of fluids by heat interchange. A. DUCKHAM & Co., LTD., and S. E. BOWREY (B.P. 368,729, 28.11.30).—In an apparatus of the type in which, *e.g.*, oil is spread by centrifugal force on the interior of a drum which is heated externally, seals are provided to prevent spray due to the fixed collecting scoop for residual oil from reaching the distillation zone, to prevent ingress of air and permit operation under vac., and for the collection of the light fraction which is condensed on a drum of smaller diam. and caught in troughs. The drum may be in sections of successively slightly smaller diam. so that several stages of distillation may be obtained. B. M. VENABLES.

Spraying of liquids [affected by air]. O. TREICHEL, and PROCURATOR VERMÖGENS-VERWALTUNGS-GES. M.B.H. (B.P. 369,908, 29.12.30. Ger., 30.12.29).—Liquids, *e.g.*, SiCl_4 , TiCl_4 , used for combating pests etc., which form crusts on exposure to air are sprayed by gas pressure through the annular space between the end of a tube and a tapered adjustable plug, one of those elements being formed of a resilient material and a cock being provided to shut off the bulk of the liquid when out of use. Means are also provided for cleaning the sprayer with, *e.g.*, MeOH when the cock is shut. B. M. VENABLES.

Apparatus for concentrating solutions. METALLGES. A.-G., and M. GENSECKE (B.P. 370,279, 13.7.31).—In a system in which the liquid is heated without evaporation and then sprayed into an evaporating chamber, the spraying nozzles are irrigated externally with liquid and are protected from heat transmission; the evaporated liquid may be used for irrigation. The vapour may be used to heat other apparatus at a lower temp., or, after compression, the same apparatus. B. M. VENABLES.

Fractionation of mixed fluids. J. V. E. NICKSON, Assr. to E. B. BADGER & SONS Co. (U.S.P. 1,815,127, 21.7.31. Appl., 11.2.25).—The vapour of, *e.g.*, hydrocarbon oil is divided into at least three rough fractions by partial condensation and reheating before admission to the main fractionating tower at different levels. A portion of the liquid is withdrawn from the main tower below the lowest feed inlet, reheated, and returned to a neighbouring point of the tower to provide heat for reboiling in a zone below the main upward flow of vapour.

By this means several fractions of definite b.p. may be obtained. B. M. VENABLES.

Liquefaction of vapour mixtures. G. B. COUBROUGH, Assr. to W. E. LUMMUS (U.S.P. 1,816,212, 28.7.31. Appl., 3.7.29).—In order to maintain the vac. in a distillation system with cooling water of rather high temp. to condense the vapours of highest b.p., a large condensate of the low-b.p. vapours is first obtained. This is then divided, part being recirculated through a cooler back to the condensing tower in countercurrent to the vapours which are sent to another condenser, forming a second condensate; and a remnant vapour, which is condensed by spray contact with the other part of the initial large condensate, usually having considerable solvent power for the vapour. B. M. VENABLES.

Gas-filtering apparatus. GEN. ELECTRIC Co., LTD., and B. VINCENT-LAMBERT (B.P. 368,731, 1.12.30).—The pressure drop across a set of filter-bags is caused to set a motor in motion which takes that set out of the gas current and operates cleaning means, *e.g.*, shaking by another motor. B. M. VENABLES.

Filtration apparatus [for gases]. SOC. FRANÇ. DES CONSTRUCTIONS BABCOCK & WILCOX (B.P. 368,492, 13.2.31. Fr., 13.2.30).—A rotating filter-mass is placed transversely in an enlargement of the gas conduit, and a pocket is partitioned off in which a section of the filter is cleaned by liquid and/or gas. B. M. VENABLES.

Gas filters having travelling filter elements. H. WITTEMEIER, Assee. of "DELBAAG" DEUTS. LUFT-FILTER-BAUGES. M.B.H. (B.P. 370,266, 23.6.31. Ger., 4.11.30).—The washing of the elements is controlled automatically in such a way that the wash-water is applied only to a section while, or just after, it is coming out of use. B. M. VENABLES.

Treatment of gases with atomised liquids, or solid substances with gas or mixtures of gas and atomised liquid. CARRIER LUFTTECHNISCHE GES. M.B.H., Assees. of H. BARTHEL (B.P. 368,733, 3.12.30. Ger., 3.12.29).—The gas to be cleaned (or the gas-borne solid substance) and the treating liquid are oppositely charged to potentials of the order of 40,000 volts, by which means the size of the particles of spray is reduced to 0.13 μ and the spray and solid matter mutually attract. B. M. VENABLES.

Apparatus for bringing liquids and gases into intimate contact. L'AIR LIQUIDE SOC. ANON. POUR L'ÉTUDE ET L'EXPLOIT. DES PROC. G. CLAUDE (B.P. 369,025, 10.4.31. Fr., 28.7.30).—Bubbling plates are constructed of annular U-shaped caps and troughs arranged in a concentric series. B. M. VENABLES.

Initiation of chemical reactions [with evolution of light] in closed vessels. HAUSER & Co. G.M.B.H. (B.P. 368,383, 5.12.30. Ger., 10.2.30).—One only of a series of flash-lamps containing metal foil in O_2 is ignited by an electric current; the others are ignited by radiation from the first. B. M. VENABLES.

Frictional materials for brakes, clutches, variable friction gearing, and the like. J. H. ROBERTSON, J. ROBERTSON, JUN., and L. GUTTERIDGE (B.P. 368,765, 10.12.30).—The material is composed of alternate layers

of fibrous material, *e.g.*, woven asbestos, and of cork, both materials being previously impregnated with natural or synthetic resin.

B. M. VENABLES.

Production of friction-resisting surfaces in bearings, guide-members, etc. made of aluminium or its alloys. VEREIN. ALUMINIUM-WERKE A.-G., and F. THOMAS (B.P. 369,059, 11.5.31).—The surface is anodically oxidised and the oxide film impregnated with oils, fats, or waxes.

A. R. POWELL.

Formation of heat- and sound-insulating coatings [on steel panels etc.]. J. W. ROBERTS, LTD., and N. L. DOLBEY (B.P. 368,368, 1.12.30 and 20.5.31).—A supply of fibrous and, if desired, non-fibrous material is blown by a fan against the surface to be coated simultaneously with, but separately from, a spray of adhesive. A twin spray gun is described, and an apparatus for pre-forming a suspension of the fibrous material in air, which is necessary in the process.

B. M. VENABLES.

Apparatus for feeding or charging coal or other granular material. S. R. ILLINGWORTH, and ILLINGWORTH CARBONISATION CO., LTD. (B.P. 369,658, 19.12.30 and 21.9.31. Addn. to B.P. 333,597; B., 1930, 1099).

Apparatus for charging blast and other furnaces. HEAD, WRIGHTSON & CO., LTD., J. M. RINGQUIST, and (SIR) T. G. WRIGHTSON (B.P. 369,569, 19.12.30).

Apparatus [surface-type geyser] for heating or boiling water or other liquids. W. LOMAX (B.P. 368,323, 28.11.30).

Conditioning of air or other gases. B. F. STURTEVANT Co., Assees. of S. M. ANDERSON (B.P. 368,275, 25.9.30. U.S., 26.9.29). HALL & KAY, LTD., P. KAY, S. HALL, and A. MYERS (B.P. 368,961, 25.2.31).

Oil cooling.—See II. Belting.—See V. Multi-chamber cement mills.—See IX. Ferrosilicon and Al_2O_3 from boiler ash. **Heat-sensitive elements.** **Friction-resisting surfaces.**—See X. **Friction material.**—See XI.

II.—FUEL; GAS; TAR; MINERAL OILS.

Present-day knowledge of coal. H. A. CURTIS (Chem. and Ind., 1932, 350—355).—A lecture.

A century of fuel economy. W. A. BONE (J. Inst. Fuel, 1932, 5, 227—244).—Melchett lecture.

Comparison of methods for testing the caking properties of coals. L. SLATER (Gas World, 1932, 96, Coking Sect., 37—40).—A no. of coals were examined by the Maurice, Barash, Burdekin, and Gray-Campredon tests and an attempt was made to correlate the vals. obtained with each other, with the C, H, and volatile-matter contents of the coals, and with the shatter indices of the corresponding metallurgical cokes produced under full-scale conditions. None of the laboratory tests in the form in which they were examined was capable of serving as an indication of the coking vals. of the coals, but it is concluded that a knowledge of the agglutinating val. is of first importance in the case of those coals which, prior to carbonisation, may be mixed with inert carbonaceous material or non-coking coals of low volatile-matter content.

C. B. MARSON.

Carbonising coal-tar pitch. A. THAU (Gas World, 1932, 96, Coking Sect., 30—32).—Pitch is coked in retort chambers provided with sole flues only, and the ovens, built of a suitable ceramic material, are closed at both ends with Fe doors. Pitch is conveyed to the ovens by a centrifugal pump, each oven taking a charge of 6 tons, and the residual coke is discharged by a normal coke-pushing ram on to a flat bench. The conversion of pitch into coke takes 4—6 hr. and the reduction of volatile matter in the coke to 0.5% takes 18—20 hr.; air is admitted through a slide in the oven doors during the latter part of the coking period to raise the temp. of the charge. Pitch thus produced is suitable for use in the manufacture of electrodes.

C. B. MARSON.

Displacement of crude oil and benzene from silica by aqueous solutions. F. E. BARTELL and F. L. MILLER (Ind. Eng. Chem., 1932, 24, 335—338; cf. B., 1930, 124).—The efficiency of different aq. solutions used as flooding agents to displace oil from oil-bearing sands does not appear to depend so much on surface-tension vals. of the liquids, nor on the interfacial vals., as on the ability of the substances dissolved to alter the aq. solution— SiO_2 interface by adsorption or chemical action. In common with other workers, it was found that alkaline solutions are most effective in displacing oils from oil-bearing sands.

H. INGLESON.

Heat problems in [oil-]cracking. S. N. OBRYPAD-CHIKOV (Rep. Conf. Cracking Hydrog. Grozni, 1931, 1, 67—118).—The heat of the cracking reaction changes with the gasoline yield; it is 400—500 kg.-cal. per kg. for a 15—20% yield of cracked gasoline. A higher heat input is required for heavy hydrocarbons which produce > 2 mols. on decomp. The heat of reaction decreases considerably in recycling operations. A rise in temp. affects the reaction only slightly. The vol. of the products of vapour-phase cracking cannot be calc. by the gas laws; an additional coeff. (approx. 3) is required.

CHEMICAL ABSTRACTS.

Corrosion of [gasoline-]cracking equipment. I. E. BESPOLOV (Rep. Conf. Cracking Hydrog. Grozni, 1931, 1, 358—377).—Corrosion by hot vapours of cracked gasoline decreases in the order: Pb, Cu, Babbitt metal, cast Fe, brass, Sn, Fe, steel. Pb is more severely attacked by lighter, and Cu by heavier, fractions. All the above metals except Cu and brass are attacked less by liquid than by vapour. In storage, untreated gasoline noticeably attacks Cu and Pb. Attack by refined cracked gasoline decreases in the order: cast Fe, brass, Al, Fe. Changes in unrefined cracked gasoline when stored in contact with various metals are described. S does not affect the stability of gasoline.

CHEMICAL ABSTRACTS.

Influence of the gasoline content of crude oil on the yield of gasoline on distillation. K. KOSTRIN (Azerbaij. Neft. Choz., 1931, No. 7—8, 58—67).—For the determination of potential gasoline content 3 kg. of crude oil, dried with Na_2SO_4 , are distilled (2 drops per sec.) from a still equipped with a Gadaskin dephlegmation column. The amount of gasoline actually present is most accurately determined when the distillation is carried out with a smaller charge. The higher is the

gasoline content of crude oil the more complete is its extraction.

CHEMICAL ABSTRACTS.

Cracking ethylene and paraffin hydrocarbons. M. D. TILITSCHÉV and A. L. FEIGIN (Rep. Conf. Cracking Hydrog. Grozni, 1931, 1, 267—297).—Ethylenic hydrocarbons are more rapidly decomposed than paraffins, the difference being least for compounds of high mol. wt. The former when cracked produce polymerisation products which decompose, whilst the latter form paraffins and olefines which polymerise and decompose.

CHEMICAL ABSTRACTS.

Composition of tractor fuel from cracked products. I. E. BESPOLOV (Rep. Conf. Cracking Hydrog. Grozni, 1931, 1, 304—322).—The composition of cracked gasoline is affected by temp. and particularly by pressure, whilst recycling has little influence. The % of aromatic hydrocarbons is increased with increase in the amount of recycle stock added. Distillates from pipe stills are richer in unsaturated compounds than those from shell stills. Products obtained from residues cracked in the vapour phase without pressure are very high in unsaturated compounds and aromatics. Compositions of tractor fuels are recorded.

CHEMICAL ABSTRACTS.

Distribution of groups of hydrocarbons in cracked gasoline cuts. I. E. BESPOLOV (Rep. Conf. Cracking Hydrog. Grozni, 1931, 1, 323—334).—Graphs showing the sp. gr. and NH_2Ph points of narrow cuts have been constructed.

CHEMICAL ABSTRACTS.

Action of sulphuric acid on fractions of cracked gasoline. I. E. BESPOLOV (Rep. Conf. Cracking Hydrog. Grozni, 1931, 1, 335—358).—Fractions of the ranges of higher b.p. contain smaller quantities of condensation products in the gasoline; the largest quantity is formed by 90% H_2SO_4 . Treatment with 80% H_2SO_4 gives the highest yield of condensation products from gasoline cracked in the vapour phase, probably owing to condensation of unsaturated with aromatic compounds. With repeated acid treatment the products are mainly sulphonation products. Sludge acid is more active than fresh acid of the same concn.

CHEMICAL ABSTRACTS.

Heavy types of cracking carried out with Surakhani fuel oil. M. D. TILITSCHÉV and L. A. ALEXANDROV (Rep. Conf. Cracking Hydrog. Grozni, 1931, 1, 240—256).—The gasoline yield is raised from 15 to 20% when recycle stock is added; the max. yield is 46%. Other yields are recorded.

CHEMICAL ABSTRACTS.

Pyrolysis of simple paraffins to produce aromatic oils. F. E. FREY and H. J. HEPP (Ind. Eng. Chem., 1932, 24, 282—288).—When gas consisting of CH_4 18.6, C_3H_8 44.7, and C_4H_{10} 36.7% is cracked the min. cracking time (min.) required to give a max. yield of volatile oils is given by $T = 691 - 100 \log t$, where T is the cracking temp., between 700° and 950°. The cracking reaction takes place in two stages: an endothermic stage, in which C_3H_8 and C_4H_{10} are decomposed into simpler paraffins and olefines with negligible oil formation; and an exothermic stage, during which oil is produced, the CH_4 content of the gases rising rapidly, the H_2 content slowly, and all other gaseous

hydrocarbons except C_2H_2 and C_2H_6 being rapidly destroyed. The volatile oil first formed contains unsaturated hydrocarbons, but with a cracking time of 0.4 min. the product is almost entirely C_6H_6 , the yield of oil with this cracking time at 850° being 14.5% and of tar 12%. The volatile oil obtained by cracking C_4H_{10} at 850° contains C_6H_6 61.1%, PhMe 9.9% with a cracking time of 0.015 min., changing to C_6H_6 92% and PhMe 5.8% when the cracking time is 0.12 min., the other constituents being chiefly butadiene and cyclopentadiene. The yield of C_6H_6 and PhMe increases with the C/H ratio.

D. K. MOORE.

Status of hydrogenation of petroleum, bitumen, coal tar, and coal. T. E. WARREN (Chem. News, 1932, 144, 193—199).—The hydrogenation processes of Bergius, of the I. G. Farbenind. A.-G., and of the Standard Oil Co., and the work of the British Fuel Research Board, are briefly described. The cost of oil hydrogenation is estimated at roughly 5.47 cents per Imperial gal. The possibility of economically hydrogenating Canadian coals or bitumens is very uncertain; a more promising field of application of these processes in Canada is to the hydrogenation of imported petroleum oils.

A. B. MANNING.

Hydrogenation of petroleum. A. N. SACHANOV and M. D. TILITSCHÉV (Rep. Conf. Cracking Hydrog., Grozni, 1931, 1, 147—208).—The high H_2 pressure retards decomp. in the initial stages. The velocity of decomp. in hydrogenation is doubled for every 10°; condensation and coke formation are slight or absent. For heavy oils the temp. of hydrogenation should not exceed 450°; the cold H_2 pressure should be 100—150 atm. Heavy oils require the use of catalysts. Distillates and residues should be hydrogenated in more than one operation. The hydrogenation of Grozni mixed-base fuel oil is described.

CHEMICAL ABSTRACTS.

Hydrogenation of Grozni mixed-base fuel oil. V. N. IPATIEV, M. A. BELOPOLSKI, and M. S. NEMTZOV (Rep. Conf. Cracking Hydrog. Grozni, 1931, 1, 119—146).—The presence of H_2 , even in the absence of special catalysts, decreases polymerisation and condensation, the hydrogenation of cracked products increasing with increase in H_2 consumption, whilst the formation of coke decreases. Better results are obtained in vapour-phase hydrogenation; reactions in the liquid phase require thorough agitation. About 2% of H_2 was consumed by the Grozni fuel oil.

CHEMICAL ABSTRACTS.

Physical and thermal properties of petroleum distillates. W. H. BAHLKE and W. B. KAY (Ind. Eng. Chem., 1932, 24, 291—301).—The pressure-temp.-vol. relationships extending from atm. pressure to beyond the crit. region are given for a commercial gasoline and a narrow-boiling-range naphtha. The equation of state and curves of sp. heat, Joule-Thomson coeff., difference of sp. heats at const. pressure and at const. vol., latent heat of vaporisation, and total heat plotted against temp. for the naphtha are given.

D. K. MOORE.

Carbureting values of gas oils and a new method for their evaluation. A. HOLMES (Ind. Eng. Chem., 1932, 24, 325—328).—The quantity of petroleum oil

required per 1000 cu. ft. of water-gas to raise its cal. val. from 300 to 530 B.Th.U. per cu. ft. = $238[T(1-d)/H]^{-1}$, where d is the sp. gr. of the oil at 100° F., H the difference in the refractive indices of the oil for the C and F lines of the solar spectrum at 100° F., and T its average b.p. in ° F. D. K. MOORE.

Recovery of used lubricating oils. D. DEMCHENKO (Grozni. Neft., 1931, 1, No. 8—10, 87—88).—Separation of H_2O and dirt is effected by heating by means of a coil carrying gas oil. After distillation the bottoms are treated with acid, fuller's earth is added after separation of sludge, and the oil is filtered.

CHEMICAL ABSTRACTS.

Performance of the Vickers [oil]-cracking coil-furnace. P. A. KHOKHRYAKOV and N. G. ZHERDEV (Rep. Conf. Cracking Hydrog., Grozni, 1931, 1, 257—266).

Heavy cracking of Grozni mixed-base fuel oil. M. D. TILITSCHÉEV and G. N. SELEDZHIEV (Rep. Conf. Cracking Hydrog., Grozni, 1931, 1, 209—239).

$(NH_4)_2SO_4$.—See VII. Road-making materials.—See IX.

PATENTS.

Carbonisation of coal. C. HAYES, Assr. to COAL CARBONISATION Co. (U.S.P. 1,810,828, 16.6.31. Appl., 16.5.27).—The coal is carbonised at 350—450° in a stationary horizontal retort, preferably cylindrical in shape, heated externally from below. The coal is alternately advanced and retracted along the retort, *e.g.*, by means of a screw conveyor, in such a manner as to give a resultant positive motion through the retort towards the discharge opening. The retort is only half-filled with coal so that ample free space is left in which the volatile products can collect; these are withdrawn through oftakes placed at intervals along the top of the retort. A. B. MANNING.

Carbonisation of fuel. H. L. DOHERTY (Assee. of H. O. LOEBELL) and A. L. KLEES (B.P. 368,485, 6.2.31. U.S., 14.2.30. Addn. to B.P. 349,937; B., 1931, 793).—Carbonaceous materials are compacted under pressure in a thin moving layer (by passing between a metal roller and moving belt), the pressure is released, and the material carbonised as previously described. The layer is shielded from radiated heat by a refractory screen until it is substantially in contact with the hot second rotor. High-volatile materials thus yield dense briquettes which are discharged continuously without adhering to the drum. R. N. B. D. BRUCE.

Distilling and gasifying carbonaceous materials underground. H. WADE. From L. C. KARRICK (B.P. 368,326, 28.11.30).—Carbonaceous materials are distilled underground by driving a tunnel through a seam of the material, packing with material broken from the walls of the tunnel, and passing hot inert gases through the tunnel. Shafts are arranged to introduce the hot gases and to collect the distillation products, from which the sensible heat is extracted for steam-raising by heat exchange. The sensible heat of the solid product is utilised to preheat a further quantity of inert gas, and the solid product may be gasified by passing through it oxidising gases (*e.g.*, air, steam, CO_2 , producer gas, or mixtures of these). H. E. BLAYDEN.

Production of artificial fuel. G. W. TRAER, Assr. to NORTHERN LIGNITE COAL Co. (U.S.P. 1,810,878, 16.6.31. Appl., 15.6.25).—A coking coal is heated to above its incipient volatilisation temp. and below its fusion temp., *e.g.*, between 320° and 370°, until the emission of volatile products ceases and the coal has lost its coking properties. The fuel so produced may be used as such, distilled at a higher temp., or briquetted. A. B. MANNING.

Apparatus for degasification of carbonaceous materials. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 368,477, 31.1.31).—The materials are degasified in retorts the walls of which are made of material containing <70% free Si. Brown coal is continuously carbonised by passing between the outside heating wall of a retort and a series of Si bricks arranged in louver fashion 3—10 cm. away from it, the gases being drawn off in the centre. An apparatus for carbonising bituminous coal consists of alternate combustion and reaction chambers of the same material. R. N. B. D. BRUCE.

Amalgamation of hydrocarbon oils and coal. W. E. TRENT (B.P. 368,421, 15.12.30. Cf. B.P. 293,454; B., 1929, 968).—Coal particles difficultly agglomerated by oil (*e.g.*, Rhode Island anthracite) are finely pulverised and agitated with H_2O and a hydrocarbon oil (*e.g.*, 12—13% by wt. of coal), separated from the liquid containing substantial proportions of rejected ash, and subjected to a second agitation with fresh H_2O , which removes a further quantity of ash and increases the size of the agglomerated masses from approx. $\frac{1}{2}$ — $\frac{1}{4}$ in. to $>\frac{1}{4}$ in. [Stat. ref.] H. E. BLAYDEN.

Manufacture of fuel. W. E. TRENT (B.P. 368,420, 15.12.30).—A plastic mixture of coal, oil, and H_2O is heated to 230°, briquetted, heated with a controlled amount of air, and finally carbonised at about 700° to give a dense fuel which retains its original structure. R. N. B. D. BRUCE.

Production of carbon black. E. KROCH (U.S.P. 1,815,851, 21.7.31. Appl., 3.5.27).—Natural gas or CH_4 is enriched with C_2H_6 and/or C_2H_4 by adding a suitable oil vapour to the gas and cracking the mixture. The enriched gas is added to a further quantity of the original gas and the product is burned with a limited supply of air to form C black. A. B. MANNING.

Activation of carbon. R. G. DAVIS and M. T. SANDERS, Assrs. to DARCO CORP. (U.S.P. 1,810,871, 16.6.31. Appl., 17.9.28).—The finely-divided C is allowed to fall freely through a tower in the upper part of which it is preheated to below 800° by passing counter-current to combustion gases and steam, and in the lower part of which it is activated by passing through an upward current of steam only, at above 850°. The lower part of the tower is heated externally to the required temp. by the combustion of producer gas or natural gas, the products of combustion being afterwards utilised in the preheating zone. A. B. MANNING.

Activation of carbon. J. T. POWER, Assr. to DARCO CORP. (U.S.P. 1,815,525, 21.7.31. Appl., 18.4.27).—Finely-divided C is dropped through a comparatively large vol. of gases containing CO_2 and H_2O , preheated to above 900° and flowing upwards at such a rate as to

produce the requisite retardation of fall of the particles which gives the necessary time of contact for activation. The total heat absorbed in activation may be introduced as sensible heat of the activating gases, or the retort in which the process is carried out may be externally heated.

A. B. MANNING.

Gas producer. A. P. VAN HEEDEN, Assr. to UNIVERSAL OIL PRODUCTS Co. (U.S.P. 1,810,738, 16.6.31. Appl., 19.10.27).—The steam-inlet pipe of the producer extends into a conical metal device within the gasifying chamber in such a manner that the steam is caused to travel downwards within the device and in contact with the walls thereof before it passes into the gasifying chamber. Air is admitted to the gasifying chamber around the outside of the device, which is highly heated by the intense zone of combustion so produced, thereby decomposing the steam before it enters the producer. The producer operates continuously.

A. B. MANNING.

Manufacture of carburetted water-gas. HUMPHREYS & GLASGOW, LTD., Asses. of E. L. HALL (B.P. 368,669, 14.9.31. U.S., 28.11.30).—Jets of air are supplied to the central portion of the fuel bed and marginally adjacent to the top of the fuel bed in the generator. Oil is also sprayed on to this marginal hot zone. When using heavy oil, any residues left in the fuel bed are thus removed by these air blasts, leaving it in a free and open condition.

R. N. B. D. BRUCE.

Purification of gases. W. J. HUFF (Assec.) and C. G. MILBOURNE (U.S.P. 1,816,533, 28.7.31. Appl., 17.7.29).—The efficiency of the removal of H_2S from gases by means of $Fe_2O_3 \cdot xH_2O$ is increased by maintaining the humidity of the gas at 45–60% of saturation. The humidity may be adjusted by first cooling the gas sufficiently to condense the excess moisture. Revivification of the oxide is effected by air of high humidity, *e.g.*, 90–95% saturated. If simultaneous purification and revivification is practised by adding air to the gases to be purified, the humidity is maintained between 70 and 95% of saturation.

A. B. MANNING.

Removal of sulphur from producer gas. PREMIX GAS PLANTS, LTD., and A. DOCKING (B.P. 368,426, 17.12.30. Addn. to B.P. 329,973; B., 1930, 853).—The temp. of the gases entering the purifier is maintained at approx. 32° by a thermostatically controlled diaphragm valve which regulates the gas supply of the heating burners.

H. E. BLAYDEN.

Oil cooling. E. N. SIEDER, Assr. to FOSTER WHEELER CORP. (U.S.P. 1,815,932, 28.7.31. Appl., 28.1.31).—In a tubular cooler, arrangements are made to pass a proportion of the oil in contact with only a part of the water-cooled tubes should the temp. of the water be too low.

B. M. VENABLES.

Apparatus for treating hydrocarbons. R. CROSS, Assr. to CROSS DEVELOPMENT CORP. (U.S.P. 1,816,827, 4.8.31. Appl., 5.4.26).—The vapours from the cracking of hydrocarbon oils are partly condensed and passed through a tower containing a metal or its salts capable of combining with S, *e.g.*, Fe, Cu, and then through one containing absorbent material, *e.g.*, fuller's earth, clay, charcoal.

D. K. MOORE.

Conversion of hydrocarbons. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 368,257, 27.10.30).—The conversion of, *e.g.*, CH_4 (or homologues) or olefines into liquid hydrocarbons, *e.g.*, C_6H_6 , is effected by passage at $> 350^\circ$ through non-metallic refractory chambers (*e.g.*, chamotte or SiC) having the inside walls coated with a glaze of a silicate, phosphate, or borate of an alkali or alkaline-earth metal, Cu, Mn, Pb, or Cr, to prevent production of C. The chambers may be packed with glazed refractory material.

H. E. BLAYDEN.

Conversion of heavy oils and similar products into lighter products. COMP. INTERNAT. POUR LA FABR. DES ESSENCES ET PÉTROLES (B.P. 367,679, 15.6.31. Fr., 16.6.30).—Oil is evaporated in a chamber containing porous contact material and the vapour passes into a subadjacent vessel containing a catalytic mass in which are distributed cooling pipes and perforated pipes through which air and/or steam may be admitted to revivify the catalyst, and thence by passage into the upper vessel to cleanse the contact mass. A no. of these units, *e.g.*, 10, are grouped together in a stove and are so connected that alternate ones are working while the rest are revivifying.

D. K. MOORE.

Cracking of hydrocarbons. N.V. NIEUWE OCTROOI MAATS., Asses. of M. W. COLONY (B.P. 367,728, 24.8.31. U.S., 9.9.30).—Superheated hydrocarbon vapours are cracked by mixing with a hot neutral gas to give a temp. above 482°, preferably of 515°. The vapours are scrubbed by the feed oil and then fractionally condensed to give the desired product, *e.g.*, motor spirit. Part of the gas leaving the last condenser is heated to 260° and passed into the scrubber to facilitate the vaporisation of the light constituents of the feed oil, part is withdrawn from the system, and the remainder is recirculated.

D. K. MOORE.

Production of light hydrocarbons. H. BUTLER, Assr. to RESEARCH PROCESS Co. (U.S.P. 1,817,672, 4.8.31. Appl., 27.12.26).—Natural gas is scrubbed with oil and the latter stripped by distillation and re-used. The vapours are cooled and compressed in two stages, each stage having its own accumulator tank. The uncondensed vapour from the last compression stage, with or without the addition of liquid from either or both of the accumulator tanks, is passed into a still in which hydrocarbon oil is cracked, the vapours from which, with or without the addition of vaporised liquid from either or both of the accumulator tanks, are condensed, yielding motor spirit. The uncondensed vapours are returned either to the cracking still or to that in which the absorbent oil is stripped. Motor spirit may also be obtained directly from the accumulator tanks.

D. K. MOORE.

Steam-distillation [of light petroleum fractions]. J. G. GLASGOW, Assr. to GULF REFINING Co. (U.S.P. 1,817,250, 4.8.31. Appl., 11.5.26).—The oil is preheated by passing through a heat exchanger with part of the hot residue from the still and by mixing with the remainder, and distilled with superheated exhaust steam.

D. K. MOORE.

Oil-purifying system. D. E. PIERCE, Assr. to ATLANTIC REFINING Co. (U.S.P. 1,816,294, 28.7.31. Appl., 15.8.26).—The vapours of hydrocarbon distillates,

especially petroleum naphthas, are scrubbed by purified oil, whereby colour-imparting and gum-forming substances are transferred to the oil. The purified vapours are condensed while the oil is purified by treatment with H_2SO_4 , settling, neutralisation, and settling, or by passing through a clay filter, and recirculated.

D. K. MOORE.

Purification of benzenoid hydrocarbon oil. P. DAMM, ASSR. to KOPPERS Co. (U.S.P. 1,817,804, 4.8.31. Appl., 30.8.30. Ger., 16.7.26).—When, *e.g.*, light oil of coal-gas manufacture is agitated with H_2SO_4 ($d^{15.5}$ 1.71—1.83) and settled layers of acid, acid resin, and oil separate out. After withdrawal of the H_2SO_4 , which may be used for many purposes without purification, the remainder is neutralised with dil. NaOH. The original impurities, liberated from the acid resin layer in modified form, dissolve in the oil, from which they are separated as a valuable residue by distillation.

D. K. MOORE.

Coking of petroleum residues. A. S. KNOWLES, ASSR. to TAR & PETROLEUM PROCESS Co. (U.S.P. 1,815,918, 28.7.31. Appl., 12.2.27).—Petroleum pitch coke or similar material (75—85%) of $< \frac{1}{8}$ in. size is mixed with coking coal (25—15%) of $< \frac{3}{8}$ in. size and carbonised in a flat-bottomed oven heated from below.

D. K. MOORE.

Dewaxing of oil. S. W. FERRIS (U.S.P. 1,816,367, 28.7.31. Appl., 9.3.28).—Petroleum oil is treated with H_2SO_4 and after separation of the sludge is cooled to below -6° , given further treatment with H_2SO_4 , and allowed to settle, whereby wax and sludge separate out.

D. K. MOORE.

Colouring of paraffin wax and the like. W. M. BAIN (U.S.P. 1,816,140, 28.7.31. Appl., 22.10.29).—An alkyl or aryl amine, preferably commercial triethanolamine, mixed with an aniline dye, *e.g.*, auramine, is dissolved in a fatty acid, *e.g.*, stearic, in slight excess of that required to combine with the amine, and added to the molten wax.

D. K. MOORE.

Refining of lubricating oils. W. D. RIAL (U.S.P. 1,816,872, 4.8.31. Appl., 13.2.29).—Lubricating oil distillates obtained by the fractional distillation of asphalt or petroleum oil are redistilled and condensed with exclusion of air and then treated with steam and aq. KOH at 138—149° under pressure.

D. K. MOORE.

Lubricants. A. J. DUCAMP (B.P. 368,025, 4.2.31).—The addition to lubricating oils of Hg salts of (or a solution of HgO in) naphthenic, oleic, or ricinoleic acids etc. prevents acidification of fatty constituents, oxidation, and cracking under heat.

E. LEWKOWITSCH.

[Valve device for closing] hydraulic mains of coke ovens. DR. C. OTTO & Co., G.M.B.H. (B.P. 371,282, 14.10.31. Ger., 14.10.30).

Production of liquid hydrocarbons by destructive hydrogenation of carbonaceous material. J. MARUHN and L. TÜBBEN (B.P. 369,798, 26.5.31).—See U.S.P. 1,807,122; B., 1932, 137.

Thermostats for safety control of oil, gas, or powdered-fuel furnaces. L. SATCHWELL (B.P. 369,618, 12.11.30).

Retorts etc. Heat-treatment of fluids. Anti-freezing liquid. [Fuel-oil] filter. Filtering apparatus. Fractionation. Liquefaction of mixed vapours.—See I. Preserving oxidisable compounds.—See III. Revivifying adsorbents. H_2 from hydrocarbons. Tar-free S.—See VII. Roads. Paving material. Cellular building materials.—See IX. Wax-like substances.—See XII.

III.—ORGANIC INTERMEDIATES.

PATENTS.

Manufacture of alcohol. DISTILLERS Co., LTD., W. P. JOSHUA, and H. M. STANLEY (B.P. 364,221, 21.10.30).— C_2H_4 is absorbed in H_2SO_4 of $< 80\%$ concn. under heat and pressure, *e.g.*, at 80—135°/50 atm., in presence of a surface extender, *e.g.*, porcelain chips, pumice, SiO_2 , etc.

C. HOLLINS.

Production of higher alcohols, particularly butyl alcohol, from ethyl alcohol. O. FUCHS and W. QUERFURTH (B.P. 364,134, 26.7.30).—In the catalytic conversion of EtOH into condensation products, the formation of undesired aldehydes and ketones is suppressed by adding H_2 to the EtOH vapour at atm. pressure. The use of a limited quantity of H_2 leads to good yields of BuOH.

C. HOLLINS.

Manufacture of aliphatic aldehydes [from lower paraffins and carbon dioxide]. BRIT. CELANESE, LTD., D. FINLAYSON, and J. H. G. PLANT (B.P. 364,023, 25.9.30).—The mixture, *e.g.*, 58% CH_4 and 33% CO_2 , is subjected to the action of silent, brush, arc, or glow electric discharge, an a.c. of up to 1000 cycles, *e.g.*, 16,000 volts at 50—100 cycles, being used.

C. HOLLINS.

Manufacture of acetaldehyde and acetic acid [from acetylene]. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 364,255, 14.11.30).—The mixture of C_2H_2 , steam, and O_2 is saturated with Hg vapour, *e.g.*, by passing over Hg at 200—260°, before contact with the hydration catalyst.

C. HOLLINS.

[Manufacture of] organic sulphur compounds. J. MROCHEM and P. MOCHALLE (B.P. 364,061, 30.9.30. Ger., 30.9.29).—S is heated to 160° with sucrose and starch in presence of air to prevent CS_2 formation. The cooled mass is suspended in H_2O and conc. to give S oils. The products have technical and therapeutic use.

C. HOLLINS.

Manufacture of acylated aromatic amines. H. DREYFUS (B.P. 363,986 and 364,040, [A] 15. and 28.8.30, [B] 15.8.30).—Benzidine, tolidine, etc. is diacylated by treatment (B) with an acid anhydride, preferably at 80—90°, in solution, suspension, or dispersion in a suitable medium, *e.g.*, H_2O , in large excess, or (A) with any acylating agent in dil. solution, suspension, or dispersion below b.p., preferably in presence of a *tert.* base and of an agent (cellulose acetate) which prevents aggregation. Examples are benzidine (A) diacetylated in xylene, dibenzoylated in methylated spirit or pyridine; (B) dibenzoylated in H_2O .

C. HOLLINS.

Electrolytic production of [organic] thiocyanoderivatives. RÖHM & HAAS Co. (B.P. 364,060, 30.9.30. U.S., 3.10.29).—The CNS group is introduced into

aromatic amines or phenols by electrolysing HCNS or its salts below 5° in presence of the org. compound. Preferably the solution contains EtOH; a (rotating) graphite anode and a Cu or Al cathode are used. The prep. of 5-thiocyano-*o*-toluidine, -anthranilic acid, and -*o*-cresol, *p*-thiocyano-dimethylaniline and -phenol, 4-thiocyano- α -naphthylamine and -resorcinol, is described.

C. HOLLINS.

Manufacture of oxidisable organic compounds, particularly rubber, oils, soaps, and aldehydes. GOODYEAR TIRE & RUBBER Co. (B.P. 364,092, 23.9.30. U.S., 12.10.29).—As antioxidants there are used products obtained by interaction of diarylmethylenediamines, $\text{CH}_2(\text{NHAr})_2$, and arylamine hydrochlorides, $\text{NH}_2\text{Ar}'\text{HCl}$, Ar and Ar' being of the C_6H_5 series. In the examples, NH_2Ar and $\text{NH}_2\text{Ar}'$ are, respectively: NH_2Ph ; *o*-toluidine; NH_2Ph and 4:6-diamino-*m*-xylene; NH_2Ph and *o*-toluidine; *o*-toluidine and 4:6-diamino-*m*-xylene.

C. HOLLINS.

Preserving oxidisable organic compounds. GOODYEAR TIRE & RUBBER Co., Assees. of W. M. LAUTER (B.P. 364,243, 8.11.30. U.S., 13.1.30).—As antioxidants in rubber, transformer oils, soaps, etc. there are used condensation products from an aminoaceneaphthene and HCO_2H or an aldehyde, e.g., formyl- (m.p. 171°), methylene- (m.p. 235–240°), crotonylidene-, or butylidene-5-aminoaceneaphthene.

C. HOLLINS.

Halogenation of anthraquinone and its derivatives. IMPERIAL CHEM. INDUSTRIES, LTD., W. W. TATUM, and R. F. THOMSON (B.P. 364,141, 2.9.30).—Anthraquinone is halogenated (e.g., chlorinated) in actinic light to give, e.g., 1:4:5:8-tetrachloroanthraquinone. The halogen in the products may be replaced by other groups, e.g., NH_2 .

C. HOLLINS.

Production of benzanthrone. W. W. TRIGGS. From E. I. DU PONT DE NEMOURS & Co. (B.P. 364,042, 24.6.30).—Anthraquinone is reduced with Fe, Al, or Cu in presence of glycerol and H_2SO_4 first at 110–115° and then at 118–120°.

C. HOLLINS.

Conversion of hydrocarbons.—See II. **Ice-colour intermediates.**—See IV. **Preps. for treating textiles.**—See VI. **Separation of CuCl and NH_4Cl [from arylamines].**—See VII. **Saponification.** Cetyl alcohol.—See XII. **Products from wood.**—See XVII.

IV.—DYESTUFFS.

PATENTS.

Manufacture of azo dyes insoluble in water [pigments and ice colours] and intermediate products therefor. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 365,531, 20.9.30).—The di(carboxyacyl)benzenes, obtained by condensation of aromatic dicarboxylic chlorides with Et acetoacetate, followed by acid hydrolysis, are converted into their arylamides, which have very good affinity for cotton and are used for manufacture of pigments or ice colours. Examples are: anilide, 5-chloro-*o*-toluidide and -*p*-toluidide of the acid from terephthaloyl chloride and Et acetoacetate; these are coupled with diazotised 5-nitro-*o*-toluidine, 3-nitro-*p*-anisidine, 4-chloro-*o*-toluidine, etc. for orange to yellow shades.

C. HOLLINS.

Preparation of stable tetrazomonoazo compounds. CHEM. FABR. VORM. SANDOZ (B.P. 365,759, 6.1.31. Ger., 7.1.30).—A tetrazotised 4:4'-diaminodiaryl is coupled with 1 mol. of an arylamine, the product is diazotised, and the tetrazonium salt is pptd. by addition of a suitable metal salt and/or an arylsulphonate. Examples are: benzidine \rightarrow α -naphthylamine, with ZnCl_2 or Na naphthalene-1:3:6-trisulphonate; dianisidine \rightarrow cresidine, with ZnCl_2 ; 2-nitrobenzidine \rightarrow α -naphthylamine, with ZnCl_2 . The products are suitable for the production of black shades on textile fibres.

C. HOLLINS.

Kibbler for dyes etc.—See I.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

The spinnometer and its use. S. IWASAKI (Sci. Papers Inst. Phys. Chem. Res., Tokyo, 1932, 18, 37–42, 43–50).—The construction and use of an experimental spinnometer for investigating factors affecting the spinnability of viscose are described. Spinnability (λ) is defined as the ratio of the greatest peripheral speed, V , with which the filament can be wound on to the bobbin, to the velocity, v , with which the viscose solution flows from the spinning orifice; then $\lambda - 1$ is the max. extensibility of the coagulum. Further, if V' is the actual winding velocity and ($\lambda' - 1$) the actual extension of the coagulum, $V'/V = \lambda'/\lambda = \mu$, where μ is the stretch ratio, and, if L is the effective length of the coagulating bath, L/v represents the relative stretch in the bath. Changes in λ with time of ripening on spinning viscose into baths of different composition and with different relative stretches (L/v), and the relation between filament strength and μ , are discussed. On addition of ZnSO_4 or MgSO_4 to the H_2SO_4 spinning bath the λ /time of ripening curve becomes higher and steeper, but on the further addition of glucose it is flattened so that the spinnability gradually falls with progressive ripening. The strength of the threads increases with increasing μ , and generally a max. is reached at $\mu = 60$ –70%, which is followed by a decrease as μ is further increased.

B. P. RIDGE.

Keratin products and sheep blowfly.—See XVI. **Wood taint in boxes.**—See XIX.

PATENTS.

Belting suitable for use in conveyors. J. DAWSON & SON, LTD., and J. DAWSON, JUN. (B.P. 366,938, 10.11.30).—Cotton fabric is impregnated with a solution of rubber latex or "Revertex," together with vulcanising and filling materials, and the product is dried, formed into plies, and rolled. Slabs formed from the rubber mix by drying are then placed on each side of the belting and the whole is vulcanised.

Measurement of humidity [of textile raw material]. H. WADE. From GHERZI-TEXTILE DEVELOPMENT Co., LTD. (B.P. 368,815, 8.12.30).—A known wt. (at zero moisture) of wool or cotton is placed in the pan of a balance the scale of which is graduated in % of moisture in the wool or cotton which is exposed to the atm. of the mill, and the indications are used to control the spinning machinery.

B. M. VENABLES.

Manufacture of solutions of fibroin. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 366,963

and 366,987, 10.9.30).—Degradation of the fibroin complex during the prep. and storage of cuprammonium hydroxide solutions of silk fibroin is counteracted by (A) maintaining the temp. at 0° to -15°, or (B) using ≥ 4 mols. of NH_3 per atom of Cu in the prep. of the solution. A further improvement in stability results if NH_3 is removed from the prepared solution by, e.g., suction or a current of an inert gas at $\geq 25^\circ$ until the ratio $\text{NH}_3 : \text{Cu}$ is $\geq 2 : 1$. ≥ 30 pts. of Cu should be used per 100 pts. of air-dry degummed fibroin.

D. J. NORMAN.

Treatment of animal fibre. A. P. FURMAN, Assr. to CORTICELLI SILK Co. (U.S.P. 1,811,119, 23.6.31. Appl., 13.7.23).—The material, e.g., degummed silk, is dissolved in a solution containing an alkali, a salt of a metal of at. wt. 55—68, e.g., Ni, Cu, Zn, and an org. compound composed of C, H, and O with 3—8 OH groups, e.g., glycerin, sucrose or other non-reducing sugar; the resulting silk solution, after filtration, is spun into a suitable coagulating bath, e.g., 15% aq. H_2SO_4 . The filaments are washed, passed through a bath of, e.g., aq. glycerin, formed into a thread, and, after partial drying, are stretched to any desired degree.

D. J. NORMAN.

Treatment of fibrous vegetable materials. V. P. H. I. W. D'OBRY (B.P. 367,406, 21.8.30).—The dry material in the form of compressed bales or blocks is moistened in a closed chamber by spraying with the condensate produced during a previous steaming process, and is afterwards steamed at 150—160°, removed from the steamer, and separated into coarse aggregations of fibres suitable for manufacture of paper, strawboard, etc., or for use as cattle feed alone or mixed with other foodstuff.

F. R. ENNOS.

Treatment [retting] of vegetable fibres. T. P. HAUGHEY (U.S.P. 1,814,155, 14.7.31. Appl., 16.5.30).—The partly decorticated material, e.g., flax straw, is washed, cut into lengths suitable for spinning, and digested without heat for up to 40 min. under a pressure of 4—20 lb./sq. in. with a dil. degumming solution, e.g., 0.125—0.5% aq. KMnO_4 , KOH , etc. The pressure is then reduced below atm. and air is introduced at the bottom of the vessel to cause violent agitation and consequent separation of the shive and gum as a foam. The fibre is washed successively with H_2O at 82°, in a beater with dil. aq. $\text{H}_2\text{C}_2\text{O}_4$, H_2SO_3 , etc., and with a softening solution, after which it is dried and baled. The gums may be recovered in their natural state by centrifuging the wash-liquor.

D. J. NORMAN.

Liberation of fibre from bagasse or like stalks. G. A. RICHTER, Assr. to BROWN Co. (U.S.P. 1,811,864, 30.6.31. Appl., 20.1.27).—The raw material, preferably freed from pith, is impregnated at room temp. in 7—12% aq. NaOH and then digested at 70—100° for 4—8 hr. Oxidants, e.g., NaOCl , may be added, or the material may be treated therewith after the preliminary impregnation and before the digestion proper. The product (yield 45—60%) is suitable for wrapping paper.

D. J. NORMAN.

Cellulosic composition of matter containing (A) acetoxime, (B) isopropyl bromide, (C) iodobenzene. S. J. CARROLL, Assr. to EASTMAN KODAK Co. (U.S.P.

1,813,660—2, 7.7.31. Appl., [A, B] 30.8.29, [C] 23.9.29).—(A) Acetoxime, (B) Pr^iBr , and (C) PhI are used as plasticisers for cellulose esters or ethers. 10—50%, preferably 10% for acetoxime, 20% for Pr^iBr , 30% for PhI , may be used on the wt. of, e.g., cellulose acetate. The resulting products show good flexibility and are of low inflammability.

D. J. NORMAN.

Increasing the affinity of cellulose esters for dyestuffs. LONZA ELEKTRIZITÄTSWERKE U. CHEM. FABR. A.-G., Asses. of G. R. LEVI and G. BENAGLIA (B.P. 369,017, 1.4.31. Ital., 1.4.30).—A small proportion of a cellulose ester of cyanoacetic, aminobenzoic, or other org. acid containing N is incorporated with the cellulose ester, e.g., acetate.

F. R. ENNOS.

Manufacture of cellulose ethers. A. S. LEVESLEY, F. C. RANDALL, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 356,308, 11.6.30).—The difficulty of grinding the products obtained by heating cellulose ethers under pressure with acid or with alkyl or aralkyl halides is avoided by conducting the digestion in the presence of sufficient of a H_2O -sol. non-acid salt which has approx. the same solubility at high and low temp. (NaCl or KCl), or is less sol. at high temp. (Na citrate), to give an approx. saturated solution at the highest temp. reached.

D. J. NORMAN.

Filter for viscose solutions. T. L. KIRBY (U.S.P. 1,811,795, 23.6.31. Appl., 1.2.27. Renewed 28.4.31).—An easily dismantled combined filter and spinning nozzle which can be totally immersed in the coagulating bath is described.

D. J. NORMAN.

Separation of cellulose or the like from treating liquid. ZELLSTOFF-FABR. WALDHOF (B.P. 368,892, 1.1.31. Ger., 19.3.30).—The treating liquids are drawn off through diaphragm plates or layers forming the bottom and walls of the container, the cellulose having been intimately mixed with the liquids by air or other gases introduced through these diaphragms.

F. R. ENNOS.

Manufacture of artificial materials from fibroin solutions. I. G. FARBENIND. A.-G. (B.P. 369,139, 18.8.31. Ger., 18.8.30).—Aq. neutral or feebly alkaline fibroin solutions (e.g., in NaCNS or ammoniacal CuO) are coagulated by means of a conc. salt solution, e.g., Na_2SO_4 , $(\text{NH}_4)_2\text{SO}_4$, HCO_2NH_4 , containing an org. or inorg. acid, if desired, and the product is afterwards stretched.

F. R. ENNOS.

Manufacture of artificial silk. ALGEM. KUNSTZIJDE UNIE N.V. (B.P. 367,628, 23.4.31. Holl., 23.4.30).—The spun yarn is passed at > 60 m./min. into a centrifuge revolving at a normal speed of 5000—8000 r.p.m. and thence, after being after-treated in the form of cakes in the usual way inside or outside the can, is wound with twisting directly on to bobbins, cops, etc.

F. R. ENNOS.

Manufacture of artificial sponges. I. G. FARBENIND. A.-G. (B.P. 369,082, 29.5.31. Ger., 5.6.30).—A mixture of viscose, solid sol. salts ($\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$), and a fibrous material (hemp) is boiled for several hr. with a salt solution (Na_2SO_4 , MgCl_2 , salts of volatile bases, etc.) containing an org. or inorg. acid; when coagulation is complete the sponges are removed and washed free from the salt with H_2O .

F. R. ENNOS.

Spinning centrifuges. BRIT. BEMBERG, LTD. (B.P. 367,725, 12.8.31. Ger., 14.8.30).—A separate drive is provided for each filament guiding-tube independent both of the main drive and that of the spinning pot.

F. R. ENNOS.

Apparatus [spinning jet] for manufacture of artificial filaments and the like. BRIT. CELANESE, LTD., and E. KINSELLA (B.P. 367,439, 20.11.30).—A form of jet ensuring accuracy as to shape and size of the spinning orifices and enabling the cleaning of the jets to be readily effected is described.

F. R. ENNOS.

Manufacture of artificial thread by the stretch-spinning process. BRIT. BEMBERG, LTD. (B.P. 367,223, 2.4.31. U.S., 2.4.30. Addn. to B.P. 300,953).—After being stretched outside the spinning vessel the thread is shrunk in an unhardened or unacidified condition, the hardening treatment being applied only after the shrinking of the thread.

F. R. ENNOS.

Washing and after-treatment of spinning cakes. VEREIN. GLANZSTOFF-FABR. A.-G. (B.P. 367,163, 6.2.31. Ger., 6.2.30).—The treating liquors are led by means of a drop in pressure from outside inwards through the suitably supported spinning cakes, which are sealed at their upper and lower surfaces. Apparatus is described.

F. R. ENNOS.

Digesting wood [by the sulphite process]. P. E. HODGDON (U.S.P. 1,810,398, 16.6.31. Appl., 27.5.29).—Wood chips are impregnated with cooking liquor in a presaturator at $> 105^\circ$ for $1\frac{1}{2}$ hr. with const. agitation, and the whole is then transferred without substantial loss of heat to the first of a battery of three digesters operating at successively rising temp. The time of treatment in each digester is about $1\frac{1}{2}$ hr. Disintegrating pumps are used for transferring the chips from one digester to another to open up the material and expedite the cooking action.

D. J. NORMAN.

Cooking of fibrous material [by the sulphite process]. T. L. DUNBAR (U.S.P. 1,814,027, 14.7.31. Appl., 1.8.29).—Hot acid is pumped into the digester until the pressure is 10–65 lb./sq. in. Steam is then introduced intermittently and when the temp. reaches $124\text{--}132^\circ$ the cook is completed without further supply of heat. Considerable economies in steam consumption are thus effected without prolonging the normal cooking time.

D. J. NORMAN.

Making white and bleached [mechanical] wood pulp suitable for manufacture of paper without addition of [sulphite] cellulose. E. ELGÉRUS (U.S.P. 1,811,783, 23.6.31. Appl., 28.3.29. Ger., 26.9.27).—Wood is treated with hot waste sulphite liquor for about 4 hr. at 3 atm. pressure and is then pulped in an edge-runner mill. No heat is supplied to the system other than that contained in the waste liquor, the required pressure being obtained by compressed air.

D. J. NORMAN.

Preparing a liquor for production of sulphite-cellulose. G. HAGLUND, ASSR. to PATENT AKTIEB. GRÖNDAL-RAMÉN (U.S.P. 1,811,268, 23.6.31. Appl., 4.1.29. Swed., 10.1.28).—Waste liquor from a NaHSO_3 digestion is mixed with a conc. aq. solution of NaHSO_3 and the mixture is treated with SO_2 . By thus operat-

ing, waste liquors are obtained containing up to 200 g. of org. matter per litre.

D. J. NORMAN.

Manufacture of paper pulp. H. D. WAGNON (U.S.P. 1,812,575, 30.6.31. Appl., 19.2.29).—Straw or similar material is digested for about 2 hr. in a liquor of $d\ 1.014$ containing Na_2CO_3 and CaO (4 : 1) and 1 gal. of hydrocarbon oil, e.g., kerosene, per ton of raw material, and is then reduced to pulp in a rod mill.

D. J. NORMAN.

Manufacture of paper [using coated broke]. H. R. RAFTON, ASSR. to RAFFOLD PROCESS CORP. (U.S.P. 1,813,362, 7.7.31. Appl., 17.3.30).—Coated broke is beaten separately and introduced into the main furnish at the mixing box at the wet end of the paper machine, irrespective of whether or not the alkaline filler and/or alum are also added at this point. (Cf. U.S.P. 1,808,073; B., 1932, 225.)

D. J. NORMAN.

Manufacture of filled [paper] pulp. H. R. RAFTON, ASSR. to RAFFOLD PROCESS CORP. (U.S.P. 1,812,832, 30.6.31. Appl., 11.12.28).—A convenient and economic method of shipping alkaline filler, e.g., lime sludge, for use in paper-making is to mix it with slush pulp and form the whole into sheets in the ordinary way. The product would normally contain up to 50% of filler.

D. J. NORMAN.

Recovery of resinous by-products in the manufacture of wood pulp. E. H. FRENCH (U.S.P. 1,810,472, 16.6.31. Appl., 29.10.28).—In the process described in U.S.P. 1,693,586 (B., 1929, 203) the acid gas (SO_2 etc.) is used both to decompose the resinates and to float the rosin thereby set free to the surface for subsequent removal.

D. J. NORMAN.

Stencil sheets. C. F. KUMLI, ASSR. to SELECTOGRAPH Co. (U.S.P. 1,810,483—4, 16.6.31. Appl., 20.12.28).—Yoshino paper is coated (A) with a solution containing glue (or other org. colloid) 22, glycerin 40, and H_2O 210 pts. by wt. and when dry is treated with 2% aq. KMnO_4 to coagulate the glue and waterproof the sheet; or (B) with a cuprammonium hydroxide-glue-glycerin solution prepared by mixing a solution containing glue 11, glycerin 20, and H_2O 43 pts. by wt. with a solution containing CuSO_4 15, aq. NH_3 (30% solution) 9, and H_2O 42 pts. by wt.

D. J. NORMAN.

Reduction of yellowing of materials with age. W. O. SNELLING (U.S.P. 1,814,344, 14.7.31. Appl., 11.4.30).—A small quantity of a fugitive yellow dye, e.g., thioflavine S or chrysophenine, is introduced into the material, e.g., paper pulp, and the colour is then corrected to white by adding the requisite quantity of a relatively permanent blue, e.g., ultramarine, indanthrene-blue R.S., and a relatively permanent red, e.g., alizarin-red, Congo-red. The nature and quantity of the fugitive yellow dye should be such that the paper is initially a good white and the yellow dye fades at the same rate as the paper itself develops a yellow colour.

D. J. NORMAN.

Manufacture of window-glass substitutes. KALLE & Co. A.-G. (B.P. 367,288, 6.7.31. Ger., 15.7.30).—A fabric insertion (wire warp, weft of textile threads which have previously been freed from air by heating in a lacquer solvent and impregnated with a suitable lacquer solution) is conducted through a thin solution

of lacquer or glue so that the meshes are not filled up. After drying, the whole is coated by known means with a lacquer layer of a cellulose ester or ether and finally dried. F. R. ENNOS.

Nozzle-head for the artificial silk stretch-spinning process. BRIT. BEMBERG, LTD. (B.P. 371,238, 17.7.31. Ger., 26.7.30).

(A) Machines for casting films or the like. (B, C) Manufacture of sheets or films of compositions containing cellulose esters or ethers. SPICERS, LTD., and A. R. WICKHAM (B.P. 369,608—10, 22.12.30).

Production of [composite threads of flattened cross-section from] artificial textile materials. BRIT. CELANESE, LTD., R. H. J. RILEY, T. C. BARNETT, and W. I. TAYLOR (B.P. 368,738, 9.12.30. Addn. to B.P. 328,312).

Friction material.—See I.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

PATENTS.

Manufacture of preparations for treating textiles and leather. ERBA, FABR. CHEM. PROD. SPEZIALITÄTEN F. DIE TEXTILIND. (B.P. 364,327, 24.12.30. Ger., 28.12.29).—Ketones and aldehydes prepared by distillation of Ca salts of fatty acids above C_{10} , alone or with HCO_2H , are emulsified with soap, Turkey-red oil, Na tetrahydronaphthalenesulphonate, etc., or are solubilised by treatment with <1 mol. of cold conc. H_2SO_4 . The products are softening agents.

C. HOLLINS.

Dyeing [printing] of textile fabrics. A. J. BELOKOPYTOFF, Assr. to K. L. MAYEHOFF (U.S.P. 1,814,783, 14.7.31. Appl., 20.6.29).—A no. of drops of thickened dye solutions are placed on a plate and then raked over to form a pattern which is then transferred to a sheet of fabric to form a printing bed. A. J. HALL.

Printing with thioindigoid vat dyes, and printing pastes therefor. I. G. FARBENIND. A.-G. (B.P. 364,052 and Addn. B.P. 364,153, [A] 29.9.30, [B] 30.9.30. Ger., [A] 15.2.30).—An oxide, a hydroxide, or a salt of a metal other than alkali and alkaline-earth metals, e.g., $FeCl_3$, $FeSO_4$, $CuSO_4$, CuS , or $ZnSO_4$, is added (0.05—0.5 mol. to 1 mol. of vat dye) to a thioindigoid vat-dye printing paste to give deeper shades and accelerated fixation. The addition is suitable whether reduction is effected (A) before or (B) after printing.

C. HOLLINS.

Making of rubberised fibre articles. N. E. BROOKES. From DEWEY & ALMY CHEM. CO. (B.P. 369,474, 30.5.31).—A fibrous felt or fleece is impregnated with latex containing a dormant coagulant, e.g., a salt providing bi- or ter-valent metal ions, activating the coagulant, e.g., by heat, thereby effecting coagulation, and embedding the fibres in the coagulum. $ZnCl_2$ (10% of a 10% solution) rendered faintly ammoniacal and added to ordinary preserved latex gives a mixture which is stable up to approx. 43° , but which coagulates almost instantaneously at 66° . D. F. TWISS.

[Apparatus for] treatment of [spun cakes] of artificial silk. J. L. RUSHTON and W. HARTLEY (B.P. 369,675 and 369,880, [A] 1.1.31, [B] 7.4.31).

[Gasoline] purification systems.—See I. Colouring paraffin wax.—See II. Cellulose esters for dyeing. Reducing the yellowing of materials with age.—See V. Cu salt compositions for fabrics.—See VII.

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

Large-scale production of ammonium sulphate. H. GERCKEL (Gas World, 1932, 96, Coking Sect., 32—33).—The Lecocq system is described. C. B. MARSON.

Technical analysis of calcium carbide. H. A. J. PIETERS and H. S. VISSER (Chem. Weekblad, 1932, 29, 188).—The wt. of C_2H_2 evolved by the action of an excess of 10% NaCl solution on a known wt. of the sample is determined by the use of a Schrödter or similar apparatus, such as is used for determination of CO_2 in carbonates; the gas outlet tube is packed with $CaCl_2$. The solution must be allowed to enter the flask very slowly in order to ensure adequate drying of the gas.

H. F. GILLBE.

Thermal decomposition of alunite. S. C. OGBURN, JUN., and H. B. STERE (Ind. Eng. Chem., 1932, 24, 288—290).—When heated to 430 — 460° alunite loses its H_2O of crystallisation, without intermediate formation of hydrates. At 575 — 800° $Al_2(SO_4)_3$ is decomposed, the gas evolved at the latter temp. consisting of SO_3 90% and SO_2 10%; the K_2SO_4 and Na_2SO_4 remain unchanged. By leaching the residue after calcination good-quality (99.3%) K_2SO_4 can be obtained, leaving a residue containing Al_2O_3 92.4, SiO_2 2.3, Fe_2O_3 2.73, MgO 2.03, K_2O 0.50, and SO_3 0.43%.

D. K. MOORE.

Deaeration of cyanide solution. F. WARTENWEILER (J. Chem. Met. Soc. S. Africa, 1932, 32, 139—145).—Methods of removing dissolved O_2 from H_2O , with especial reference to the deaeration of Au and Ag cyanide solutions by the Crowe vac. process, are reviewed. Thorough deaeration of cyanide solutions prevents formation of $Zn(OH)_2$ in the pptn. boxes and accelerates pptn. of Au, as the Zn particles remain clean and active in the absence of air until they are completely dissolved; Zn consumption is therefore lower and the bullion of higher grade.

A. R. POWELL.

Complex vanadium catalysts showing high volumetric velocities. I. E. ADADUROV, G. K. BORESKOV, and M. A. GLINSKAYA (J. Appl. Chem., Russia, 1931, 4, 611—620).—Catalysts converting $>99\%$ SO_2 into SO_3 at 450° are of high grade; low volumetric velocity can be improved by increasing the dispersion of the catalyst, adding more inert material, or introducing an activator.

CHEMICAL ABSTRACTS.

Determination of sulphur dioxide in burner gases. E. SCHMIDT (Papier-Fabr., 1932, 30, 133).—The determination of SO_2 and SO_3 by the Frank-Waldhof method, recently criticised by Schepp and Schiel (B., 1932, 61), gives good agreement with gravimetric analysis. Schepp and Schiel's method is objectionable on the grounds of two separate samples being required and the error introduced by CO_2 into a phenolphthalein titration.

It is more suitable in H_2SO_4 manufacture than for the sulphite-pulp industry. C. IRWIN.

Knowles hydrogen plant at the Warfield works of the Consolidated Mining & Smelting Co. of Canada, Ltd. ANON. (Chem. and Ind., 1932, 355—358).

Analysis of red lead and PbO_2 .—See XIII. Fe_2O_3 for rubber.—See XIV. Sorption phenomena in SiO_2 gels.—See XVI.

PATENTS.

Manufacture of sulphuric acid from weak sulphur dioxide gas. H. F. MERRIAM, Assr. to GEN. CHEM. CO. (U.S.P. 1,822,447, 8.9.31. Appl., 16.1.28).—Exit gases from a contact plant are led into a tower together with a descending stream of $NO \cdot SO_2 \cdot OH$ (d 1.64), having a "nitre" content of 1.5—0.6%, and thence to a second tower, fed with $NO \cdot SO_2 \cdot OH$ (d 1.53—1.57) of 0.12% "nitre" content, to complete oxidation of the SO_2 and effect reoxidation of reduced nitrous gases. The oxidised gases are absorbed by $NO \cdot SO_2 \cdot OH$ (d 1.64), and the acid from the second tower is recirculated through the system and brought into contact with fresh SO_2 -containing gas. W. J. WRIGHT.

Apparatus for oxidation of ammonia. J. Y. YEE (U.S.P. 1,821,956, 8.9.31. Appl., 30.6.28).—The catalytic gauze is placed between a roof and a base member, these being provided with concentric, annular, apical rings and grooves, and serving to preheat the gas mixture passing to the catalyst and cool the gases leaving it, respectively. W. J. WRIGHT.

Regeneration of caustic alkali waste liquors. ASAHI KENSHOKU KABUSHIKI KAISHA (B.P. 368,783, 9.12.30. Jap., 17.12.29).—The alkalis are recovered by dialysis through a membrane into H_2O or dil. alkali under conditions such that the hydrostatic pressures and the velocities of flow of the two liquids are so adjusted that the osmotic pressure on the membrane is counterbalanced and the total pressure on each side of the membrane is the same. The liquids flow vertically in the same or opposite directions through the dialysis chamber, which may have tapering sides or the membrane disposed to one side to help to maintain the necessary conditions. L. A. COLES.

Treating [recovering ammonia, potash, and phosphates from] nitrogenous waste materials. F. N. MOERK, Assr. to E. Q. LANDRETH (U.S.P. 1,820,920, 1.9.31. Appl., 1.6.23).—The waste material (sewage, garbage, etc.) is incinerated, the gases generated are scrubbed, e.g., with dil. H_2SO_4 , and the solution obtained is passed through the ash from the incinerator. Suitable apparatus is described. L. A. COLES.

Production of borax from brines. M. A. DEBEAU and H. L. ROBSON, Assrs. to BURNHAM CHEM. CO. (U.S.P. 1,821,092, 1.9.31. Appl., 6.2.28).—Brine, e.g., from Searles Lake, California, is successively conc. to half its vol., treated to reduce the concn. of CO_3 and SO_4 ions (e.g., by heating to about 70° to ppt. Na carbonate-sulphate), filtered, and treated at 15 — 25° with sufficient SO_2 to reduce the solubility of the borax to 10 g. B_2O_3 per litre; the solution is then agitated to ppt. the borax. L. A. COLES.

Recovery of supersaturants [borax from brine]. L. H. DUSCHAK, Assr. to BURNHAM CHEM. CO. (U.S.P. 1,814,300, 14.7.31. Appl., 10.10.27).—Brine supersaturated with borax by atm. evaporation in ponds is agitated in a thickener with cryst. borax to promote crystallisation, and the still somewhat supersaturated mother-liquor is passed through a filter-cake of cryst. borax to remove additional crystals which are returned to the thickener for seeding. A. R. POWELL.

Treatment of crude mineral salts [caliche]. E. JÄNECKE, H. KLIPPEL, and E. HEGELMANN, Assrs. to I. G. FARBENIND. A.-G. (U.S.P. 1,813,575, 7.7.31. Appl., 20.12.27. Ger., 14.12.26).—Caliche is moistened with H_2O or with mother-liquors containing $NaNO_3$ and $NaCl$, and steam is passed into the vessel above the material while suction is applied below, whereby a boiling saturated solution of salts is obtained which on cooling deposits cryst. $NaNO_3$. A. R. POWELL.

Production of potassium sodium sulphate. G. B. BURNHAM, Assr. to BURNHAM CHEM. CO. (U.S.P. 1,814,284, 14.7.31. Appl., 16.11.25).—A supersaturated solution of $NaCl$ and $NaKSO_4$ from Searles Lake brine is agitated with an upward current of a saturated solution of these salts containing suspended $NaCl$ crystals, whereby the excess $NaCl$ in the first solution separates. After removal of the crystals the process is repeated with a liquor containing suspended $NaKSO_4$ crystals, to remove the excess of this salt from the supersaturated solution. A. R. POWELL.

Production of alkali phosphates by converting ferrophosphorus with alkali sulphates. F. ULLMANN, J. BRESLAUER, and E. LIE (U.S.P. 1,817,858, 4.8.31. Appl., 20.7.29. Ger., 24.7.28).—A 1 : 2 mixture of ferrophosphorus and K_2SO_4 with 2% of carbonaceous material is fused and poured into H_2O , whereby a solution of K_3PO_4 is obtained together with a residue of Fe , FeO , and FeS . A. R. POWELL.

Manufacture of diammonium phosphate. B. G. KLUGH and W. R. SEYFRIED, Assrs. to SWANN RESEARCH INC. (U.S.P. 1,822,040, 8.9.31. Appl., 16.7.28).— $(NH_4)_2HPO_4$ mother-liquor is added to conc. H_3PO_4 , and NH_3 introduced into the mixture until the latter contains about 68% $NH_4H_2PO_4$ and 12% $(NH_4)_2HPO_4$, all the H_2O in the H_3PO_4 being evaporated by the heat of reaction. 42% $(NH_4)_2HPO_4$ solution is added to bring the proportions to 46% and 22%, respectively, air being excluded, and NH_3 gas is introduced above the solution in sufficient amount to form $(NH_4)_2HPO_4$, the solution being agitated during the treatment. W. J. WRIGHT.

Preparation of barium silicoferrite. H. W. DAHLBERG (U.S.P. 1,821,208, 1.9.31. Appl., 12.7.29).—A mixture of $BaCO_3$, Fe_2O_3 , and SiO_2 is heated at $< 1100^\circ$; the product has m.p. $> 1300^\circ$. L. A. COLES.

Treatment of copper protoxide and articles made therefrom. SIEMENS & HALSKE A.-G. (B.P. 369,142, 27.8.31. Ger., 12.2.31).—The resistance of Cu_2O masses for use, e.g., in photoelectric cells, thermopiles, and rectifiers is reduced by heating at 400 — 650° (preferably 535°) and then quenching. Alternatively, Cu_2O produced by heating Cu in air at about 1000° is cooled to a temp. $> 650^\circ$ and then quenched. L. A. COLES.

Separation of cuprous and ammonium chlorides [formed as by-products in arylamine manufacture]. E. C. BRITTON and H. R. SLAGH, Asssts. to DOW CHEM. CO. (U.S.P. 1,814,822, 14.7.31. Appl., 5.5.30).—The mother-liquor from the prep. of NH_2Ph from PhCl and aq. NH_3 in the presence of Cu_2O contains CuCl and NH_4Cl , which are separated by diluting the solution to 20% NH_4Cl and treating it with NH_3 in excess of 1 mol.-equiv. of the CuCl present, whereby $\text{CuCl}\cdot\text{NH}_3$ separates in colourless crystals. Evaporation of the mother-liquor affords NH_4Cl ; dissolved NH_2Ph and PhOH are recovered from the vapours.

A. R. POWELL.

Copper salt compositions particularly [suitable] as a preservative liquid for treating timber, fabric, and other materials. J. V. EYRE, H. LANGWELL, and DISTILLERS CO., LTD. (B.P. 367,913, 29.11.30).—A solution of Cu oleate in BuOH , Bu lactate, or diacetone alcohol is mixed with sulphonated castor oil and the mixture is emulsified with H_2O or with 4% aq. NaCl or 15% aq. $\text{Na}_2\text{SO}_4\cdot 10\text{H}_2\text{O}$.

A. R. POWELL.

Manufacture of zinc oxide from the metal or materials containing it. COMP. FRANÇ. DE TRANSFORMATION MÉTALLURGIQUE (B.P. 366,808, 15.4.31. Fr., 15.4.30).—Zn scrap is fed on to a bed of coke heated to 1400° in a series of retorts in a heating chamber and the issuing Zn vapour and CO are burned to produce ZnO . The heat of combustion is conducted back into the retorts and serves to maintain the temp. of the coke bed therein.

A. R. POWELL.

Manufacture of [stable suspensions in liquid] metal carbonyls. J. Y. JOHNSON, From I. G. FARBENIND A.-G. (B.P. 367,819, 18.9.30 and 30.3.31).—The material, e.g., reduced pyrites cinders or reduced Ni powder, is made into a paste with 1–20% H_2O , gasoline, or glycerin and the paste is agitated with $\text{Ni}(\text{CO})_4$ or $\text{Fe}(\text{CO})_5$ to form a homogeneous suspension which settles extremely slowly.

A. R. POWELL.

Manufacture of metal oxide adsorbent gels. H. WADE, From SILICA GEL CORP. (B.P. 368,796, 11.9.30).—Solutions of salts of metals yielding insol. oxides [e.g., $\text{Al}_2(\text{SO}_4)_3$, TiCl_4 , or mixtures of these] are neutralised at a temp. $\geq 20^\circ$ to within the limits 0.1N acidity to 0.1N alkalinity; the ppt. is removed, washed, and dried at $100\text{--}200^\circ$. [Stat. ref.]

L. A. COLES.

Recovery of beryllium compounds from beryllium-bearing minerals. C. ADAMOLI (B.P. 369,162, 30.10.31. Ger., 16.1.31).—The minerals, ground to pass 6000-mesh, are treated for several days with CO_2 at atm. or raised pressure in the presence of H_2O and acid or basic catalysts (e.g., HCl , NH_3); the solution, which contains Be, Ca, and Mg carbonates and a little SiO_2 , is treated as usual for the recovery of BeO , and the residue is, if necessary, re-treated.

L. A. COLES.

Production of alumina [from clay]. A. S. BURMAN and I. RENNERFELT (B.P. 369,244, 11.11.30. Swed., 11.11.29).—Clay is calcined at $700\text{--}800^\circ$ and digested with HCl to dissolve Al_2O_3 and other bases. The solution is evaporated and any alkali chloride removed, a sol. carbohydrate obtained by digesting wood or starch with HCl is added, and the conc. solution is sprayed into a shaft or on to a heated surface to expel

HCl and leave finely-divided Al_2O_3 , Fe_2O_3 , and C , which is subsequently treated in a reducing atm. to reduce the Fe_2O_3 to Fe . The product is leached with acid to remove Fe and the residue again reduced and leached until pure Al_2O_3 is obtained.

A. R. POWELL.

Recovery of alumina from aluminous siliceous material. ELECTRIC SMELTING & ALUMINUM CO., Asses. of A. W. SCHEIDT (B.P. 369,593, 12.12.30. U.S., 26.12.29).—A mixture of material containing Al_2O_3 and SiO_2 (e.g., ash, clinker, coal-mine strippings) with CaCO_3 and Na_2CO_3 , with the addition, if desired, of bauxite etc., in proportions such that the product contains at least 1 mol. of NaAlO_2 per mol. of Ca_2 silicate, is sintered and NaAlO_2 is leached from the product. The residue is used as a fertiliser or for the production of Portland cement.

L. A. COLES.

Deoxidiser [for the air in transformers, oil switches, etc.]. A. H. MAUDE, C. J. RODMAN, C. A. STYER, and W. C. WILHARM, Asssts. to WESTINGHOUSE ELECTRIC & MANUFACTURING CO. (U.S.P. 1,821,388, 1.9.31. Appl., 21.12.23).—The material comprises equimol. proportions of Cu and NH_4Cl , together with kieselguhr, a catalyst (activated C), and H_2O ; CaCl_2 may be added if desired.

L. A. COLES.

Revivifying adsorbent materials. E. B. MILLER, Assr. to SILICA GEL CORP. (U.S.P. 1,822,303, 8.9.31. Appl., 7.6.22).—The material is heated in a non-oxidising gas or vapour, e.g., CO_2 or steam, to expel occluded matter, such as oil, and then subjected to a high temp. in presence of air to oxidise impurities.

W. J. WRIGHT.

Preparation of plural gels. E. H. BARCLAY, Assr. to SILICA GEL CORP. (U.S.P. 1,822,848, 8.9.31. Appl., 21.10.29. Ger., 20.10.27).—A 10% solution of $\text{Ti}_2(\text{SO}_4)_3$ or TiCl_4 is mixed with an equal quantity of a solution of $\text{Al}_2(\text{SO}_4)_3$ or AlCl_3 at -2° , and aq. NH_3 is added until the mixture is slightly alkaline. The resultant gel, after separating and washing, is dried at 100° and heated for 2–3 hr. at $150\text{--}200^\circ$. The product is capable of absorbing H_2O vapour up to 21% when in equilibrium at $30^\circ/22$ mm. Hg.

W. J. WRIGHT.

Manufacture of activated sorbent material. A. B. LAMB (U.S.P. 1,813,174, 7.7.31. Appl., 22.9.25. Renewed 22.12.28).—Natural hydrated silicates, e.g., chabazite, are heated at 300° in vac. until H_2O ceases to be evolved, and then at 650° to remove further quantities of H_2O . After cooling the porous product, which still retains its cryst. form, it is treated with NH_3 and again heated in vac. at temp. gradually rising to 700° , whereby a highly active and selective adsorbent is obtained.

A. R. POWELL.

Preparation of metal [uranium] hydrides. F. H. DRIGGS, Assr. to WESTINGHOUSE LAMP CO. (U.S.P. 1,816,830, 4.8.31. Appl., 25.11.29).—The powdered metal is heated below 200° in an evacuated vessel to remove adsorbed gases, and then at $225\text{--}435^\circ$ while H_2 is slowly admitted to the vessel at a rate about equal to the rate of absorption and at a pressure of 3–700 mm., according to the temp.; with excess of H_2 reaction to UH_4 is almost explosive at 225° . Zr , Ti , and Th hydrides may be prepared in a similar manner.

A. R. POWELL.

Production of hydrogen [from hydrocarbons]. M. K. VINTNER (U.S.P. 1,817,726, 4.8.31. Appl., 6.8.29).—Hydrocarbon gas, *e.g.*, natural gas, is passed through a chamber packed with porous refractory and preheated to a temp. at which the gas is cracked into H_2 and C, the latter being deposited on the refractory. The C is burned to CO by passing air into the chamber and the CO is burned to preheat the refractory in a second chamber, which is then used for the cracking process. The process is thus rendered cyclic and no external fuel is required. A. R. POWELL.

Production of pure, tar-free sulphur from used gas-purifying mass. K. SZOMBATHY, Assr. to P. SCHMITZ and K. KELL (U.S.P. 1,815,811, 21.7.31. Appl., 21.1.28. Ger., 22.1.27).—The spent gas-purifying material is boiled with aq. $Ca(OH)_2$ and Na_2SO_4 (or Na_2CO_3), whereby the S is converted into alkali polysulphides. The solution is filtered and treated with SO_2 , or other acid gas, for a time sufficient to decompose the polysulphides without forming thiosulphates, and the pptd. S is separated. If desired, the solution of polysulphides may be purified by treatment with activated C before decomp. with SO_2 . A. B. MANNING.

Purification of air containing hydrogen sulphide. F. W. SPERR, JUN., Assr. to KOPPERS Co. (U.S.P. 1,817,778, 4.8.31. Appl., 18.5.27).—The air is blown through an alkaline solution (*e.g.*, 1–3% aq. Na_2CO_3) containing a foam-producing substance and a compound of a metal having an affinity for H_2S , *e.g.*, Fe_2O_3 . A. R. POWELL.

Continuous production of carbon dioxide ice [by expansion]. W. T. COMER (B.P. 369,629, 23.12.30. U.S., 28.12.29).

Apparatus for cooling and solidifying carbon dioxide. CARBON DIOXIDE Co., LTD., and E. R. SUTCLIFFE (B.P. 369,670, 31.12.30).

Drying of materials [$NaCl$].—See I. Recovering salts from speiss. Al_2O_3 from boiler ash.—See X. Fertilisers.—See XVI.

VIII.—GLASS; CERAMICS.

Residuals in the melting of commercial glasses. W. EITEL and W. WEYL (J. Amer. Ceram. Soc., 1932, 15, 159–166).—The equilibria at pressures up to 1250 atm. and at 1400° between CO_2 and the alkali silicates have been studied in a “bomb” furnace. The amount of CO_2 taken up increases with the pressure, decreases with rise in temp., and increases with the SiO_2 content of the melt. The amount of CO_2 taken up by the alkali silicates decreases in the order K_2O , Na_2O , $CaO-Na_2O$, Li_2O ; $Li_2O.2SiO_2$ shows no noticeable reaction with CO_2 , whilst Na_2SiO_3 takes up 5.6% CO_2 at 1400°/750 atm. The CO_2 is chemically combined as carbonate and with K_2O melts crystals of K_2CO_3 have been found. The importance of the presence of CO_2 and other melt residuals (*e.g.*, SO_3 , O_2 , etc.) in commercial glasses is discussed in connexion with “fining,” colouring, decolorising, working, and vac. technique. J. A. SUGDEN.

Colour formation in vitreous bodies. F. H. NORTON and V. J. DUPLIN, JUN. (J. Amer. Ceram. Soc.,

1932, 15, 206–212).—The colouring effect of various oxides in a typical Parian body was studied with a recording spectrophotometer. Except at the extreme ranges the saturation, brilliance, and hue are all linear functions of the logarithm of the concn. of the colouring oxide. Microscopical examination showed that the colour is due to undissolved particles and that there is very little dissolution in the glass. The thin sections showed no colour by transmitted light, but the characteristic colour by reflected light. J. A. SUGDEN.

Decolorisation [of glass] with cerium. I. J. LÖFFLER (Glastechn. Ber., 1931, 9, 501–506; Chem. Zentr., 1931, ii, 2919).—A small Ce content causes discoloration of glass; the effect disappears above 1% Ce. The discoloration produced by ultra-violet irradiation is prevented by addition of PbO and other oxides which absorb ultra-violet rays. Glass free from Pb developed a brownish superficial layer, which is due to the presence of As. Sb and W caused discoloration on intense irradiation. For decolorisation, 3 times as much CeO_2 as FeO is necessary; the quantity of CeO_2 can be diminished by addition of KNO_3 . Purification could be effected with NaCl, and better with Na_2SO_4 . Coloration by residual As and Sb can be corrected by addition of Ni or Se. A. A. ELDRIDGE.

Effect of superficial chemical treatment, especially with metallic oxides, on the hydrolytic properties of glass surfaces. M. VON HIRSCHBERG and F. H. ZSCHACKE (Sprechsaal, 1931, 64, 790–793; Chem. Zentr., 1931, ii, 3376–3377).—Extractability of alkali is affected, usually being decreased, when glass is heated in various media. Poor glass is improved, and good glass is deteriorated, by lustring. $SnCl_4$ increases, whilst HCl and NO_3' diminish, the quantity of alkali which can be removed. A. A. ELDRIDGE.

The “moisture expansion” of glasses. L. H. MILLIGAN and D. ARMITAGE (J. Amer. Ceram. Soc., 1932, 15, 167–170).—Bars of plate glass, Pyrex, and several glasses used as grinding-wheel bonds were heated for 1 hr. in saturated steam at 150 lb./sq. in. and a control series was heated for 1 hr. in an air oven at 184° (temp. of the saturated steam). Within the accuracy of measurement (0.0015% with a Zeiss optimeter), no case of increase in length was observed. J. A. SUGDEN.

Microscopic examination of ceramic raw material and fired products, a help in plant control. I. RHODE and H. HARKORT (J. Amer. Ceram. Soc., 1932, 15, 179–187).—A general description of works' petrographic technique. J. A. SUGDEN.

Rapid method of estimation of alumina in clays. R. W. ELLISON (J. Amer. Ceram. Soc., 1932, 15, 188–190).—With a given clay the loss on ignition (clay dried at 105°) is inversely proportional to the SiO_2 content, and therefore a determination of the loss on ignition, the Fe_2O_3 , and the sum of the TiO_2 , CaO , MgO , and alkalis (const. for a given clay) enables the Al_2O_3 to be calc. J. A. SUGDEN.

Brittleness.—See I.

PATENTS.

[Tank-furnace for] production of molten glass. J. L. DRAKE, Assr. to LIBBEY-OWENS-FORD GLASS Co.

(U.S.P. 1,818,203, 11.8.31. Appl., 27.7.27).—The out-flow end of the tank is provided with a baffle wall reaching nearly to the bottom so that only the lowest layer is withdrawn for working into sheets etc.; the wall slopes outwardly or is shaped to form a pocket at the far end of which is an opening through which the surface scum flows out of the furnace. L. A. COLES.

Glass melting preheater and mixer. G. G. BROCKWAY, Assr. to NICHOLS COPPER CO. (U.S.P. 1,815,890, 28.7.31. Appl., 4.1.29).—A preheater for the raw materials may be constructed like a multi-hearth roaster and is heated by the waste gases of the glass furnace. B. M. VENABLES.

[Gathering pot for] glass furnace. A. KADOW, Assr. to OWENS-ILLINOIS GLASS CO. (U.S.P. 1,815,258, 21.7.31. Appl., 7.11.27).—The gathering pot comprises a rotating pool with a conical deflector in the middle, over which the stream of glass from the tank-furnace flows and forms an annular sheet in the pool. The temp. may be controlled by combustion inside an embracing dome or by water-cooling inside the conical deflector. B. M. VENABLES.

Production of terra-sigillata coatings on ceramic ware. A. COMES (B.P. 369,135, 6.8.31).—A slip prepared from dil. alkali and plastic clay that becomes red on firing is set aside for 4–5 weeks, during which it is decanted off frequently from any ppt. formed, and then is not disturbed for another 2 weeks; the gelatinous mass formed is used for coating the pottery, which is fired at about 1000°. The reddish tint of the finished ware may be changed to grey or black by steaming after firing. L. A. COLES.

Providing objects of ceramic materials, particularly porcelain, with metallic [copper] coatings. C. LANOY (B.P. 369,534, 20.10.31. Holl., 20.10.30).—The article is coated with a paste made by grinding Cu_2O (72%), graphite (3%), and a Pb-Na borate frit with H_2O , dried, and fired at 700° in a reducing atm., e.g., in a graphite-cased chamber. The frit is absorbed by the ceramic material, leaving a rough coating of Cu which may be polished and subsequently electroplated with more Cu or with another metal. A. R. POWELL.

Manufacture of refractory [resistant to molten slag and glass]. D. W. ROSS and J. M. LAMBIE (U.S.P. 1,818,506, 11.8.31. Appl., 3.1.29).—A SiO_2 - Al_2O_3 refractory having $d \geq 2$ and porosity $\geq 24\%$ and containing $\leq 40\%$ of glass, a total of $\leq 70\%$ of SiO_2 , and $\geq 6\%$ of materials other than SiO_2 and Al_2O_3 is prepared, e.g., by firing a mixture of (a) grog containing Al_2O_3 , $\leq 70\%$ of SiO_2 , and $\geq 6\%$ of flux, mainly MgO , which has been fired until it contains $\leq 40\%$ of glass, and (b) other material containing Al_2O_3 and SiO_2 . L. A. COLES.

[Manufacture of] basic refractory bricks etc. C. S. GARNETT, and GARNETT BASIC REFRACTORIES, LTD. (B.P. 368,798, 13.9.30).—A roughly moulded mixture of finely-ground, natural or lightly calcined dolomite, substances to retard hydration of the finished article (kaolin, labradorite), and H_2O is calcined at 1500°, and a mixture of the product (crushed to yield a mixture as dense as possible of coarse and fine particles) with dolomitic lime, kaolin, and Al_2O_3 , worked to a paste

with an oil yielding little or no fixed carbon on destructive distillation (e.g., Anglo-Persian gas oil), is moulded under pressure and calcined at about 1450°. L. A. COLES.

Manufacture of a silicon carbide refractory article. R. H. MARTIN, Assr. to NORTON CO. (U.S.P. 1,818,904, 11.8.31. Appl., 22.7.27. Cf. U.S.P. 1,653,918; B., 1928, 158).—SiC articles are coated with a mixture consisting mainly of finely-divided MgO and Al_2O_3 and fired at Orton cone 16. L. A. COLES.

Manufacture of tools composed of diamond fragments. P. A. POULAIN (B.P. 368,322, 27.11.30. Belg., 27.11.29).—Graded diamond dust is bonded with a fusible clay and the mixture heated until the clay vitrifies. A. R. POWELL.

Manufacture of glassware [bottles etc.]. BRIT. HARTFORD-FAIRMONT SYND., LTD., and T. WARDLEY (B.P. 369,555, 19.11.30).

Manufacture [sealing-off] of glass articles [tubes]. GEN. ELECTRIC CO., LTD., and R. L. BREADNER (B.P. 369,722, 17.2.31).

Firing of pottery and enamel goods. Powdering enamels.—See I. Window-glass substitute.—See V. Linings for induction furnaces.—See X. Resins and plastics [for reinforced glass].—See XIII.

IX.—BUILDING MATERIALS.

Multi-chamber mills with air separation for superfine cement. A. B. HELBIG (Cement, 1932, 5, 108–117).—The grinding of cement is discussed in relation to the greatly increased demand for superfine cement the strength of which far exceeds the specification requirements. Fine grinding in one operation is not good practice, and it is considered that the process will develop into a pre-grinding to a max. size of 0.5 mm., followed by fine grinding with air separation, the latter grinding being best effected in multi-chamber mills. C. A. KING.

Changes occurring within a Portland cement kiln. W. N. LACEY and H. E. SHIRLEY (Ind. Eng. Chem., 1932, 24, 332–335; cf. B., 1930, 145).—Samples were taken, over a period of 5 hr., in a 102-ft. dry-process, rotary Portland cement kiln, of the powder at different positions. The well-dried charge lost its combined H_2O rapidly in the first 30 ft. The CaCO_3 decomposed appreciably at 15 ft. from the feed end and completely at 20 ft. from the discharge end. Recombination of CaO set free from CaCO_3 did not begin until the charge was nearly halfway through the kiln, and was not completed until within 10 ft. of the discharge end. The rate of CO_2 evolution roughly corresponded to increase in sp. gr. H. INGLESON.

Hardening of Portland cement. J. E. LOVENTHAL (Cement, 1932, 5, 87–88).—The solubility of SiO_2 in 3% HCl when finely-divided SiO_2 ("Mo-ler"—a Danish diatomaceous, sea-water deposit) was allowed to remain in contact with a solution of CaO increased from 2 to 24.4% after 74 days. A similar increase was observed when cement- SiO_2 blocks were stored in distilled H_2O . It is concluded that the hydrolysis of Ca silicates of cements cannot proceed to the ultimate products $\text{Ca}(\text{OH})_2$ and SiO_2 gel when at the same time

a Ca silicate is formed by the action of CaO on SiO₂. (Cf. Tippman, also Kühl; B., 1931, 678, 721; 1932, 263.) C. A. KING.

Properties of Portland cement particles smaller than 10 microns. J. H. JENNINGS (Cement, 1932, 5, 99—102).—The strengths shown by the finest fractions were so great that the varying strengths of different cements might easily be due more to differences in grinding than in composition. The difference between the clinker corresponding to the flour and the original clinker was marked, and it is concluded that either two clinkers of different composition were mixed or that different lumps of the same clinker varied by 2%. Clinkers of higher CaO content gave the most readily ground material. C. A. KING.

Preliminary tests for cement of the new German Standard Specification. G. HAEGERMANN (Cement, 1932, 5, 91—92).—The "finger-nail" test for setting was in error in 1¼% of the tests compared with the Vicat needle. A simple test for initial set consists in pressing an Fe rod having a rounded end 4 mm. in diam. into a pat 1.5 cm. from the edge. Initial setting has commenced when a crack is formed connecting the hole with the edge of the pat. The final set may be determined by the mass crumbling or scaling when a slice 2 mm. thick is cut from the pat with a knife. The accelerated boiling test may exclude cements which are perfectly sound. C. A. KING.

Estimation of free lime in cement. G. A. ASHKENASI (Cement, 1932, 5, 93—96).—The substitution of CaSO₄·2H₂O by CaSO₄ during the grinding of cement did not effect any change in the quantity of free CaO detected. Portland cement alone when heated sets free CaO, the amount of which increases with the duration of heating; e.g., at 1100° after 2 hr., free CaO was 0.45%; after 110 hr., 9.6%. Addition of gypsum accelerates the decomp., but BaSO₄ was without effect. C. A. KING.

Chemistry of bituminous road-making materials. A. VON SKOPNIK (Chem.-Ztg., 1932, 56, 85—86, 105—106).—Methods recommended by German road-building authorities for testing asphalt bitumen, road tar, tar emulsions, and macadamising mixtures are briefly outlined. A. R. POWELL.

Wood taint in boxes.—See XIX.

PATENTS.

Manufacture of cellular building materials. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 368,742, 9.12.30).—H₂O-sol. acid tars, which may be completely or partly neutralised with NH₃ or a base metal, are used as foaming agents (cf. B.P. 315,205 and 315,209; B., 1929, 817, 950). L. A. COLES.

Construction of macadam roads. H. PLAUSON and M. IMER (B.P. 368,800, 5.11.30).—The interstices between the stones are filled with a mortar comprising cement, CaO, and a quantity of bituminous material (tar) >15% of the mixture. L. A. COLES.

Manufacture of paving material. R. L. WHITE (U.S.P. 1,818,876, 11.8.31. Appl., 5.11.29).—Approx. 1500 lb. of pulverised rock asphalt is mixed firstly with 3 gals. of oil having a high sp. gr. and low asphalt

content, to soften the rock asphalt, and then with 3 gals. of oil of low sp. gr. and high asphalt content. In order to prevent adhesion in bulk, 6 gals. of H₂O are incorporated into the mass, which hardens when spread owing to loss of H₂O. C. A. KING.

Preparing a tightening means or composition [putty substitute]. N. V. TOT VOORTZETTING DER ZAKEN VAN PIETER SCHOEN & ZOON (B.P. 369,834, 13.7.31. Holl., 14.7.30).—Two pastes comprising, e.g., (a) 100 pts. by wt. of chalk, 14 pts. of raw linseed oil, 2 pts. of boiled linseed oil, 0.6 pt. of K oleate, and 30 pts. of glycol, and (b) 2000 pts. of PbO, 67.5 pts. of kieselguhr, 135 pts. of H₂O, and 135 pts. of K oleate, are kneaded together shortly before use. L. A. COLES.

Dry kiln [for timber]. J. A. RANKIN, Assr. to MOORE DRY KILN CO. OF OREGON (U.S.P. 1,815,798, 21.7.31. Appl., 28.7.27).—A method of circulating the air in a timber kiln is described. B. M. VENABLES.

Manufacture of scagliola marble slabs, tiles, and the like. J. W. MEES (B.P. 369,092, 16.6.31).

Damp-proof composition [for walls etc.]. J. T. WILLSON (B.P. 368,950, 19.2.31).

Furnaces.—See I. Al₂O₃ from siliceous material. Cu salt compositions for timber.—See VII. Manufacture of metals and cements etc.—See X. Converting wood into sugar etc.—See XVII.

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

Technical heat-consumption efficiency of a furnace. G. NEUMANN (Arch. Eisenhüttenw., 1931—2, 5, 471—475).—Mathematical. Equations are deduced to express the heat balance in metallurgical furnaces. A. R. POWELL.

Behaviour of manganese in the manufacture of steel. F. KÖRBER (Stahl u. Eisen, 1932, 52, 133—142).—The reaction between manganiferous Fe and a slag consisting almost entirely of FeO and MnO has been studied between 1520° and 1950°. The consts. for the Mn equilibrium between metal and slag were found to be irregularly distributed about a curve the equation to which corresponded with that of the reaction isochore derived from the simple law of mass action, and the heat of reaction for the transfer of Mn from metal to slag calc. from the curve agreed with that determined calorimetrically. The solubility of O in liquid Fe increases linearly with rise in temp., but with rise in temp. the ratio FeO/MnO increases rapidly towards infinity. The deoxidation equilibrium diagram of Mn has been constructed for liquid deoxidation products and its modification for ideal dil. slags approximating to those used in practice is discussed. From this and from the equilibrium diagram of the system FeO—MnO the regions in the concn. plane Mn—O₂ (in the metal phase), in which liquid and solid deoxidation products separate from the molten metal, are defined on the assumption of the additivity of the lowering of the m.p. of Fe by Mn and O. Conclusions drawn from the theoretical space diagram of the deoxidation of Fe by Mn as to the nature of the non-metallic inclusions in metal containing Mn and O contents have been confirmed by microscopical

examination. The changes which take place in the composition of the metal in the Thomas converter during blowing are discussed, and it is shown that the rapid decrease in the val. of the consts. of the Mn equilibrium is an indication of the change in the character of the slag from acid to basic, which is of paramount importance for the successful carrying out of the process. During solidification of Thomas steel in the mould a remarkably rapid decrease in the total O content of the metal takes place; this is in agreement with the equilibrium diagram proposed.

A. R. POWELL.

Molybdenum [in steel and iron]. J. L. GREGG and H. W. GILLET (Met. & Alloys, 1932, 3, 98—104).—A review.

Properties of steel ingots in relation to method of production with special reference to the Harmet process. W. EICHHOLZ and J. MEHOVAR (Arch. Eisenhüttenw., 1931—2, 5, 449—468).—Most of the phenomena observed in the formation of an outer ring of blow-holes at the top of cast-steel ingots are to be attributed to the reaction $\text{FeO} + \text{C} = \text{Fe} + \text{CO}$ and not to the presence of dissolved CO in the molten steel; this action is assisted by the mechanical movements of the steel during solidification. Completely sound ingots of plain and alloy steels can be produced by using the Harmet process of casting, which overcomes the tendency to produce unsound places along the axis of the ingot, prevents segregation, and produces a fine-grained central portion in the ingot. The properties of hollow castings for the production of thin-walled seamless tubes of large diam. are described.

A. R. POWELL.

Hot strength of plain and alloy cast steel. K. H. MÜLLER and E. PIVOVARSKY (Arch. Eisenhüttenw., 1931—2, 5, 483—485).—The drop-hardness (Wüst-Bardenheuer method), tensile strength, and limiting creep stress (to produce an elongation of 0.003% per hr. in the 10th—15th hr. of the test) of cast steel at 100—500° are improved slightly by addition of Mn, but appreciably by addition of Cr, especially in combination with W or, better still, with Ni. The effect of these additions on the notched-bar impact strength is exactly the opposite; no definite relation between impact strength and drop-hardness could be established. Curves are given for all these properties for 8 different steels at 20—500°.

A. R. POWELL.

Effect of cold-work before heat-treatment on the tensile properties of steel. E. GREULICH (Arch. Eisenhüttenw., 1931—2, 5, 487—491).—Cold-rolling of plain C steel with < 0.3% C accelerates the formation of granular cementite and the softening of the steel on annealing below the A1 point. C steels in this soft state are hardened to a greater extent by cold-rolling and soften more rapidly on further annealing than do steels with a banded pearlitic structure. The increase in the yield point and tensile strength of austenitic Cr-Ni steels produced by pptn. hardening is greater and is produced in a shorter time and in a wider temp. range if the steel is first given a slight reduction by cold-rolling; with reductions of over 10%, however, the pptn.-hardening effect decreases and finally disappears with about a 30% reduction. After an irregular deformation, this type of steel is liable to develop cracks

on annealing, owing to carbide pptn. producing uneven hardening effects.

A. R. POWELL.

Experiences with the rapid magnetic determination of carbon [in steel] with Malmberg's carbometer. H. KORNFELD (Arch. Eisenhüttenw., 1931—2, 5, 477—481).—The results obtained by numerous steelworks laboratories in using the carbometer for the determination of C in hardened, plain carbon, and alloy steels have been compared with the analytical results. The carbometer figures varied frequently by as much as $\pm 30\%$ from those obtained by analysis, showing that the carbometer is of qual. val. only.

A. R. POWELL.

System iron-chromium. F. WEVER and W. JELLINGHAUS (Mitt. Kaiser-Wilh. Inst. Eisenforsch., 1931, 13, 143—147; Chem. Zentr., 1931, ii, 2924—2925).—Thermal, dilatometric, conductivity, structure, and fine-structure investigations on alloys containing 5.8—75.6% Cr are recorded. The compound FeCr, formed very slowly, may retain excess of Fe and Cr in solution.

A. A. ELDRIDGE.

Properties of silicon steels. TAMURA (Rev. Mét., 1931, 28, 405—415; Chem. Zentr., 1931, ii, 3147).—With increasing Si content the A1 and A3 points of the steels (C 0.08, Si 0.33—1.96%; C 0.135, Si 0.82, Mn 0.96%) were raised; the particle size, electrical resistance, permeability, elastic limit, resistance to wear, hardness, and resistance to corrosion were increased, whilst the extensibility, constriction, tenacity, and resistance to vibration were reduced.

A. A. ELDRIDGE.

Oxidative, sulphatising, and chlorinating roasting. I. Oxidation of copper, iron, zinc, lead, and silver sulphides with dry air. II. Oxidation of sulphides with moist air or water vapour. III. Chlorinating roasting of copper and silver sulphides. B. NEUMANN and W. LANGER (Arch. Erzbergbau, 1931, 1, 55—62, 63—68, 69—73; Chem. Zentr., 1931, ii, 2924).—I. [With G. KÖHLER.] The oxidation of Cu_2S , CuS , FeS , FeS_2 , ZnS , PbS , and Ag_2S was followed at various temp. by means of thermal measurements.

II. Superheated dry steam behaves like an indifferent gas. Changes suffered by the above sulphides when heated in an atm. free from O_2 are also recorded.

III. [With G. KÖHLER.] The formation of SO_2 , SO_3 , HCl , and Cl_2 is discussed. Chlorinating roasting is possible at about 350°. The intervention of O_2 is essential in the chlorinating process.

A. A. ELDRIDGE.

Corrosion of [sugar-factory] evaporator tubes. F. J. BULLEN (Internat. Sugar J., 1932, 34, 151—153).—The corrosion of the brass tubes of an evaporator used at a Natal sugar factory employing the sulphitation process was found to be due to the action of SO_2 , volatile org. acids, H_2O vapour, and air. Photomicrographs of the metal gave evidence of twinning and other cryst. weakness, at which points corrosion would be initiated and, proceeding by intercryst. paths, would eventually eat into the walls of the tubes. It is possible to provide an alloy having a micro-structure free from the inherent weaknesses associated with cryst. form. Such metal is capable of about 8 years' immunity from tube failure.

J. P. OGILVIE.

Corrosion of metals by milk. Effects of operating conditions on corrosion in various parts of pasteurising equipment. H. A. TREBLER, W. A. WESLEY, and F. L. LAQUE (Ind. Eng. Chem., 1932, 24, 339—350).—The corrosion of Ni, Cu, nickel-silver, Cr-Ni, and Cr-Ni-Fe in sweet milk has been studied. In milk which is being heated to and held at the pasteurising temp., Ni is only slightly corroded. The normal increase in corrosion rate due to temp. rise was prevented by protective film formation on Ni, which was favoured by aëration and high velocity of the milk. In the cooling-down process no protective film was formed and corrosion was appreciable during the initial stages of cooling, decreasing steadily as the temp. fell. Nickel-silver behaved in a somewhat similar manner, but Cu was not noticeably protected on heating. A Cr-Ni alloy (12—15% Cr) is suitable for all types of pasteurising equipment. An alloy of Fe with Cr 18% and Ni 8% would probably be suitable also. H. INGLESON.

Effect of cold-rolling and annealing on the solubility of cartridge brass in chromic acid. J. D. PARENT (Ind. Eng. Chem., 1932, 24, 318—320).—Weighed samples of cartridge brass, of which the composition corresponded to the α -solid solution, were rotated at 20° below the surface of a solution containing 30 g. of $\text{Na}_2\text{Cr}_2\text{O}_7 \cdot 2\text{H}_2\text{O}$ and 35 c.c. of H_2SO_4 (d 1.84) per litre. Losses in wt. were determined after 20, 40, 60, and 80 min. exposure. The Rockwell hardness, grain size, and grain orientations were determined. Curves are given relating corrosion losses with hardness and grain size and showing the effect of annealing. It is concluded that under the conditions employed, grain size of itself is not a determining factor of the corrosion. More important factors are inner stresses, chemical and physical homogeneity, and orientation of the grains. H. INGLESON.

Corrosion protection by chromium plating. H. LEISER (Metallwaren-Ind., 1931, 29, 431—432; Chem. Zentr., 1931, ii, 3151).—Cr alone does not offer protection against rust; intermediate non-porous layers are necessary. Pores may be detected by means of the ferroxyl indicator or by deposition in them of Cu at low c.d. Unchromed places are detected by dipping the article in a solution of 150 g. of CuSO_4 and 10 c.c. of H_2SO_4 in 1000 c.c. of H_2O . The salt-spray test is described. A. A. ELDRIDGE.

Electrolytic deposition on aluminium and its alloys. M. BALLAY (Metallwaren-Ind., 1931, 29, 335—336; Chem. Zentr., 1931, ii, 3036).—Before deposition of Ni the Al is treated with slightly acid FeCl_3 solution. A. A. ELDRIDGE.

[Mineral] flotation: some operating details. K. E. ARMYTAGE (Bull. Inst. Min. Met., 1932, No. 329, 14 pp.).—Apparatus described and illustrated for carrying out laboratory flotation tests comprises a mill and classifier, a hypodermic reagent feeder, a dip-stick continuous reagent feeder, a small sub-aëration cleaner cell, and two types of vac. filter for p_{H} tests of the pulp H_2O . A. R. POWELL.

Gasoline-cracking equipment.—See II. **De-aëration of cyanide solution.**—See VII. **Blast-furnace slag [for soils].**—See XVI.

PATENTS.

Linings for molten-metal containers [for induction furnaces]. ELECTRIC FURNACE CO., LTD., Assees. of E. F. NORTHRUP (B.P. 369,065, 14.5.31. U.S., 26.7.30).—The lining of a high-frequency induction furnace is made of SiO_2 , ZrSiO_4 , sand, or fused MgO tamped outside an asbestos-cement shield which serves as a temporary container for the metal to be melted; when the metal has melted and the heat has sintered the refractory, this shield melts and rises to the surface of the metal as a fused slag which is readily removed.

A. R. POWELL.

Treatment [reduction] of iron ore. H. A. BRASSERT, Assr. to H. A. BRASSERT & Co. (U.S.P. 1,815,899, 28.7.31. Appl., 14.1.29).—The ore is reduced with gases containing CO in a vertical shaft furnace or rotary kiln and then smelted in an externally gas-fired shaft furnace, the gases from which are passed through red-hot coke to provide reducing gases for the first stage.

A. R. POWELL.

Manufacture of synthetic pig iron. T. F. BAILY (Assee.) and L. G. PRITZ (U.S.P. 1,821,783, 1.9.31. Appl., 28.1.28).—A mixture of scrap steel with acid and basic slag in such proportions as to yield a metal of the desired Mn and P content is melted on a bed of coke in a shaft furnace, the coke being heated by electrical resistance and the conditions being so adjusted that the desired Si content is taken up as the metal falls through the coke bed.

A. R. POWELL.

Simultaneous manufacture of iron or other metals and of Portland cements or hydraulic limes. L. P. BASSET (B.P. 368,312, 27.9.30. Fr., 28.9.29).—A mixture of finely-divided Fe ore, C, CaO, and other fluxes to yield a slag containing 21—22% SiO_2 , 6—8% Al_2O_3 , and 63—67% CaO is heated in an inclined rotating furnace fired with a reducing coal dust-air flame in such a way that a loose friable mixture of cement and fine Fe prills is obtained. The charge is cooled in a chamber through which air for the combustion of the coal dust is passed in order to preheat it. Finally, the Fe is separated from the cement by means of a magnet.

A. R. POWELL.

Manufacture of steels and alloy steels. VEREIN. STAHLWERKE A.-G., Assees. of P. KÜHN (B.P. 369,258, 15.9.30. Ger., 14.9.29).—A charge of pig Fe, scrap Fe, and spiegeleisen containing 1.6—2.4% Mn is treated under oxidising conditions in the basic open-hearth furnace for about one half the usual period so as to transfer the greater part of the Mn to the slag. The temp. is then raised above 1600° and CaO is added in several charges to the slag, heating being continued until the metal bath contains 0.8—1.2% Mn together with the required C content. The resulting steel has a high tenacity and a low sensitivity to ageing, cold-shortness, and "blue-brittleness." A. R. POWELL.

Treatment of [iron blast-furnace] slag. J. M. HUGHES and R. C. BUTLER (U.S.P. 1,814,808, 14.7.31. Appl., 3.6.30).—Slag from the blast furnace after passing through the skimming runner passes through a slag runner to a settling tub which is wider than the runner, so as to decrease the velocity of the slag stream and thus provide an opportunity for the settlement of suspended globules of Fe. A. R. POWELL.

Recovering metals [ferrosilicon] and oxides [alumina] from boiler ash. T. F. BAILY (U.S.P. 1,815,888, 28.7.31. Appl., 2.4.29).—The ash is fused with C in an electric furnace to produce ferrosilicon and a slag containing up to 80% Al_2O_3 . A. R. POWELL.

Purification of steel. H. A. BOST and E. C. HUMMEL, Assrs. to OTIS STEEL CO. (U.S.P. 1,814,584, 14.7.31. Appl., 27.2.30).—Refined Ni steel is cast into moulds without previous deoxidation and, just at the end of the pouring operation, 0.75–0.8 lb. of molten Al per ton of steel is introduced at the bottom of the moulds to deoxidise the metal and remove gases. A. R. POWELL.

[Steel for] homogeneous armour plate. F. KRUPP A.-G. (B.P. 369,108, 3.7.31. Ger., 30.7.30).—The steel contains $\geq 0.26\%$ C, 2–4% Cr, 0–3% Ni, and 0.15–1% Mo or 0.3–3% W, Ni + Cr being $\geq 5.4\%$ and Cr \geq Ni. After hardening, the plate is tempered at 700–750°. A. R. POWELL.

Steel alloy. D. F. YOUNGBLOOD (U.S.P. 1,822,792, 8.9.31. Appl., 10.5.29).—A hard, non-rusting steel for the manufacture of vaults etc. contains 1.6–1.7% C, 6.5–7.5% Mn, 0.6–0.7% Si, 1–1.5% Cr, 1.9–2.5% Ni, and 0.25–0.4% Mo. A. R. POWELL.

[Making] bimetallic articles [copper-coated steel wire]. A. E. WHITE, From COPPERWELD STEEL CO. (B.P. 368,284, 2.12.30).—A thin layer of Cu is cast around a steel core centred in a mould, the ingot is rolled down to the desired shape, and additional Cu is applied to the coating by electrodeposition. A. R. POWELL.

Magnetic material [iron-nickel alloy]. G. W. ELMEN, Assr. to WESTERN ELECTRIC CO., INC. (U.S.P. 1,818,054, 11.8.31. Appl., 20.6.30).—An alloy having high initial permeability and high sp. resistance comprises Fe with 33–50% Ni and 0.3–5% Si. A. R. POWELL.

(A) **Manufacture**, (B) **refinement, of magnetic metals and alloys.** W. S. SMITH, H. J. GARNETT, and W. F. RANDALL (B.P. 366,523 and 368,780, [A] 31.10.30, [B] 6.12.30).—(A) Fe-Ni alloys containing up to 0.2% Si are hot-rolled to about 3–4 times the desired final thickness, annealed, cold-rolled to the finished state, and finally heated at 1150° to develop a high permeability. (B) Molten Fe or Fe-Ni alloy is blown with a blast of N_2 containing sufficient O_2 or suspended NiO or Fe_2O_3 to oxidise the C present in the metal; the pressure in the furnace is then reduced to complete the reaction between FeO and C and to remove the CO formed in the metal. A. R. POWELL.

Heat-treatment of [chromium] alloy steels. P. R. KUENRICH (B.P. 368,277, 2.10.30).—After shaping, steel containing 17–25 (19–20)% Cr and 0.65–0.95 (0.75)% C is annealed at 1020–1120° (1080°), quenched in air, H_2O , or oil, and bright-finished. A. R. POWELL.

Case-carburising and heat-treating metals [iron and steel]. P. V. BROWER, Assr. to CARBIDE & CARBON CHEMICALS CORP. (U.S.P. 1,817,345 and 1,817,407, 4.8.31. Appl., 19.7.27).—The metal is heated at 845–915° in an atm. of (A) 70% CO_2 and 30% C_2H_6 , propylene, *n*- or *iso*-butane, or butylene, preferably under pressure, or (B) 50% H_2O vapour and 50% C_2H_6 . A. R. POWELL.

Welding process [for structural steel]. LINDE AIR PRODUCTS CO. (B.P. 368,605, 22.5.31. U.S., 3.7.30).—The bevelled (60°) edges to be joined are heated with an O_2 - C_2H_2 flame containing an excess of C_2H_2 to carburise and lower the m.p. of the metal along the edges of the weld, and the cavity is filled up with a welding rod comprising mild steel with 0.1% C or a steel alloy containing Mn and Si. A. R. POWELL.

Accelerating the reaction in aluminothermic processes, especially in their application to welding. W. SANDER, Assr. to T. GOLDSCHMIDT A.-G. (U.S.P. 1,822,506, 8.9.31. Appl., 23.12.30. Ger., 16.11.29).—A small quantity of Na, Mg, or, especially, Ca is added to the thermit mixture. A. R. POWELL.

[Inhibitor for] treating metals [pickling steel]. J. C. VIGNOS, Assr. to RUBBER SERVICE LABS. CO. (U.S.P. 1,817,500, 4.8.31. Appl., 14.1.28).—An aryl disulphide, e.g., $(\text{CH}_2\text{Ph})_2\text{S}_2$, is added to the H_2SO_4 bath. A. R. POWELL.

[Inhibitor for] metal [steel] pickling baths. G. L. MAGOUN and D. H. TOMPKINS, Assrs. to RUBBER SERVICE LABS. CO. (U.S.P. 1,816,860, 4.8.31. Appl., 6.11.30).—The use of the sulphonated reaction product of a thiourea derivative with an alkyl aldehyde-ammonia is claimed. The condensation product of $\text{CS}(\text{NHPh})_2$ and acetaldehyde-ammonia is specifically mentioned. A. R. POWELL.

[Copper-antimony]-zinc alloy. L. E. WEMPLE and F. A. WARREN (U.S.P. 1,818,774, 11.8.31. Appl., 21.1.31).—An alloy of Zn with 0.1–2.25% Cu and 0.01–2% Sb is claimed. A. R. POWELL.

Treatment of ores [auriferous arsenical pyrites]. A. J. KOEBEL (U.S.P. 1,814,602, 14.7.31. Appl., 8.3.28).—The finely-divided ore is blown with an air blast into an oil-fired reverberatory furnace with a sloping hearth so that vigorous oxidation occurs while the particles are suspended in the furnace and the As, Zn, Pb, Au, and Ag are volatilised, whereas the Fe, SiO_2 , etc. form a fusible slag which collects in the furnace. The fumes are passed through a baghouse and the dust is heated in a second furnace to remove As_2O_3 . Zn is then recovered by distilling the residue with powdered coal, and the Pb remaining in the retorts is treated for recovery of Au and Ag in the usual way. A. R. POWELL.

Separation of metals [bismuth from lead ores]. G. U. GREENE, Assr. to AMER. SMELTING & REFINING CO. (U.S.P. 1,821,634, 1.9.31. Appl., 8.8.29).—The ore is roasted at 450–600° with 2–5% of NaCl, whereby the Bi is volatilised as BiCl_3 and the Cu is converted into a form sol. in dil. H_2SO_4 . A. R. POWELL.

Treatment of arsenious ore. A. R. LINDBLAD (U.S.P. 1,822,103, 8.9.31. Appl., 22.4.30. Swed., 24.4.29).— As_2O_3 fume from roasting arsenical ores is rendered innocuous by mixing it with cement and water and allowing the mixture to harden before dumping. A. R. POWELL.

Removal of tin from antimonial lead and alloy. T. D. JONES, Assr. to AMER. SMELTING & REFINING CO. (U.S.P. 1,821,643, 1.9.31. Appl., 31.8.29).—The molten alloy is vigorously stirred by means of a small impeller set in the middle of the kettle so that the Sn drops

formed on the surface is drawn into the vortex and circulated through the molten metal until the dross begins to stop the action of the impeller. After skimming, the process is repeated until the Sn is reduced to 0.01%. No As or Sb is lost if the operation is carried out at 480°.

A. R. POWELL.

Recovery of nickel and cobalt or pure salts thereof [from speiss]. NORDEUTS. AFFINERIE (B.P. 369,120, 22.7.31. Ger., 9.9.30).—Speiss containing Cu, Pb, Fe, Ni, and Co with small quantities of precious metals is mixed with S and fused in a reverberatory furnace to obtain a Cu-Pb-Fe matte containing the precious metals and a conc. Co-Ni speiss. The latter is finely ground and heated at 200° with H₂SO₄ in a cast-Fe pan to produce As₂O₃, Sb₂O₃, and sulphates of the other metals. Excess H₂SO₄ is removed by suction and the paste washed with a little cold H₂O and then boiled with H₂O to separate the sol. sulphates from the insol. acid oxides. The solution is treated for the recovery of NiSO₄ and CoSO₄, and the residue is roasted to remove As₂O₃ and then smelted to recover Sb, Pb, and precious metals.

A. R. POWELL.

Improvement of cobalt-molybdenum alloys. VEREIN. STAHLWERKE A.-G. (B.P. 368,058, 23.2.31. Ger., 4.7.30).—Co alloys with 10–35% Mo are annealed above 1000°, quenched in cold H₂O, and tempered at 500–900° (800°). The Brinell hardness of the 25% Mo alloy is thereby increased from 165 to 215.

A. R. POWELL.

Manufacture of metals [molybdenum, iron] from solid metal carbonyls. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 367,996, 17.1.31).—The finely-ground carbonyl is allowed to fall freely through a cylinder heated at a temp. above the dissociation temp. of the carbonyl.

A. R. POWELL.

Preparation of a metallic composition [tungsten carbide die]. LER. L. WYMAN, ASSR. to GEN. ELECTRIC Co. (U.S.P. 1,822,720, 8.9.31. Appl., 15.7.29).—Cutting tools and wire-drawing dies are made from a sintered mixture containing WC and > 25 (13)% Co and > 3 ThO₂.

A. R. POWELL.

Metallic refractory material [tungsten alloy]. J. G. DONALDSON and H. L. COLES, ASSRS. to GUARDIAN METALS Co. (U.S.P. 1,820,966, 1.9.31. Appl., 21.12.26).—An alloy of 95–48 (90)% W, 0.5–45 (3)% Si, 1–5 (2)% Ni, 2–5 (4)% C, and 0.3–5 (1)% Mo is claimed especially for the construction of doors and walls of vaults.

A. R. POWELL.

Recovering gold and silver [from shale]. S. A. GILES (U.S.P. 1,818,846, 11.8.31. Appl., 22.11.29).—The finely-ground shale is blown through an oil-fired furnace in such a way that the particles are heated to 960° in an oxidising atm. which removes C, S, and As, and then fall through a reducing atm. into a spray of H₂O; the Au may be recovered by amalgamation and cyanidation from the pulp produced.

A. R. POWELL.

Rendering silver and silver-plate tarnish-resisting. A. O. WATKINS (B.P. 367,991, 14.1. and 26.3.31).—The polished article is rubbed with a paste made by moistening inert material with 0.25% aq. NH₄Br or 0.5% aq. HCl.

A. R. POWELL.

Preparation of [silver] alloy [containing beryllium]. H. S. COOPER, ASSR. to BERYLLIUM CORP. OF AMERICA (U.S.P. 1,816,961, 4.8.31. Appl., 2.12.25).—An alloy of Ag with up to 10% (3–5%) Be, with or without other metals, is prepared by electrolysis of BeO in Na₂BeF₄ over a fused Ag cathode. The alloys are claimed to be resistant to tarnishing.

A. R. POWELL.

Separating volatile metals [magnesium etc.] by sublimation. H. E. BAKKEN, ASSR. to AMER. MAGNESIUM CORP. (U.S.P. 1,814,072, 14.7.31. Appl., 11.1.26).—Mg containing Na is sublimed at 600° (0.2–0.5 mm.) and the vapours are condensed in a long tube the temp. gradient in which is maintained const. so that the lower end is at 600° and the upper at about 90°. Na collects at the upper end of the condenser and Mg at the lower end and in the middle. A similar procedure serves for the purification of Ca, which sublimates at 800° in vac.

A. R. POWELL.

Forging of magnesium alloys. G. MICHEL, ASSR. to SOC. "LE MAGNESIUM INDUSTRIEL" (U.S.P. 1,816,983, 4.8.31. Appl., 24.3.28. Fr., 31.3.27).—Mg alloys with < 6 (4)% Cu, < 6 (2)% Al, and 0.2–1.5 (1)% Cd are heated for some time at 485° and forged at 495–475°.

A. R. POWELL.

Treatment of welded structural members, of light metal [magnesium alloy], with closed, hollow cross-section. I. G. FARBENIND. A.-G. (B.P. 368,649, 4.8.31. Ger., 4.10.30).—The inner surface of the weld is protected from atm. corrosion by coating it with a film of marine glue or lacquer.

A. R. POWELL.

Aluminium-silicon alloys. ALUMINIUM, LTD., ASSRS. of B. T. HORSFIELD, L. W. KEMPF, and W. L. FINK (B.P. 368,843, 12.12.30. U.S., 15.1.30).—Alloys consisting of Al with 2–25 (5)% Si and 0.03–2 (0.1)% Be are claimed.

A. R. POWELL.

Improving aluminium alloys which are resistant to corrosion by sea-water. METALLGES. A.-G. (B.P. 367,831, 21.11.30. Ger., 4.12.29).—Alloys of Al with 0.1–10% Mg, 0.1–6% Si, and at least one of the metals Mn, Ni, Co, Cr, Ti, Bi, Sb, or Cd are quenched from just below the m.p. and allowed to age for some days at room temp.

A. R. POWELL.

Apparatus for cleaning of metal strip. IMPERIAL CHEM. INDUSTRIES, LTD., and W. H. SMITH (B.P. 367,437, 20.11.30).—The strip is passed continuously in a sloping path through a vessel in which a volatile grease solvent is boiled and condensed at the top of the vessel, so as to fall down on the strip in the form of a shower. A series of shallow collecting trays under the strip are provided with felt pads on an overflow lip against which the underside of the strip presses, and wiping means are provided at or near the point at which the strip leaves the tank.

A. R. POWELL.

Protecting metal and other material liable to be injuriously affected by the action of acid, or acid or other fumes, or for confining the said fumes in, or conducting them to, any desired place. A. H. KILNER (B.P. 369,430, 16.4.31).—The material is wrapped or coated with a fabric which has been impregnated with viscose or the like and then treated with an acid to regenerate the cellulose.

A. R. POWELL.

Applying a protective coating to metallic articles. VEREIN. STAHLWERKE A.-G. (B.P. 368,538, 24.3.31. Ger., 3.5.30).—The article is sprayed with a mixture of finely-ground quartz or other inorg. filler with powdered cresol- CH_2O resin suspended in tar oil and/or anthracene oil having a b.p. within the range at which the resin hardens and is converted into the insol. and infusible form. The coating is then hardened by heating at 200° .

A. R. POWELL.

Bimetallic heat-sensitive elements. LANDIS & GYR SOC. ANON. (B.P. 369,001, 23.3.31. Switz., 27.3.30).—The bimetallic strip is wound into a helix and this helical tube is itself wound into a coil or spring.

A. R. POWELL.

Production of soldering materials [fluxes]. R. E. MÜLLER (B.P. 368,841, 12.12.30. Ger., 27.12.29).—Mixtures of resins, *e.g.*, colophony, with org. bases or their salts, *e.g.*, NH_2Ph or *o*-toluidine hydrochloride, or diphenylguanidine, are claimed. The mixtures may be packed into solder tubes for use.

A. R. POWELL.

Production of magnesium by electrolysis in a molten bath. I. G. FARBENIND. A.-G. (B.P. 369,536, 27.10.31. Ger., 8.11.30).—The bath comprises a mixture of alkali and alkaline-earth chlorides with 5–15% MgCl_2 , *e.g.*, 10% MgCl_2 , 40% CaCl_2 , 35% NaCl , and 15% KCl . Electrolysis is carried out at $700\text{--}750^\circ$ with 50 amp. per sq. dm. at 8–10 volts.

A. R. POWELL.

Electrodeposition of metals. J. BILLITER (B.P. 368,412, 12.12.30. Austr., 14.12.29).—Wires, rods, or tubes of metal to be plated are fed continuously through a plating bath which is kept in motion by rotation of the anode. The cathode is also rotated and during the plating operation passes through a polishing or burnishing device. Tubes may be prepared by electrodeposition on homogeneous Cr-Si-Fe alloys to which the deposited metal does not adhere, or by using fusible alloys or fusible non-metallic materials coated with graphite which can be removed by heating.

A. R. POWELL.

Electrodeposition of metal [zinc]. W. H. HANNAY and F. E. LEE, Assrs. to CONSOLIDATED MINING & SMELTING CO. OF CANADA, LTD. (U.S.P. 1,821,970, 8.9.31. Appl., 21.2.29).—In the production of Zn by electrolysis of ZnSO_4 solutions obtained in the hydrometallurgical treatment of Zn ores the electrolyte contains (per litre) 140 g. of Zn and 10–100 mg. of Fe; the latter acts as a weak anodic depolariser by producing an adherent coating on the Pb anode.

A. R. POWELL.

Electrolytic separation [deposition] of copper. M. SCHLOTTER, Assr. to ASOCIACION DE PRODUCTORES DE YODO DE CHILE (U.S.P. 1,817,527, 4.8.31. Appl., 28.9.29. Ger., 29.10.28).—A bath comprising a solution of CuI (6%) in 60% aq. KI is claimed. Cu may be deposited at 0.3 volt and c.d. 400 amp. per sq. m.

A. R. POWELL.

[Cadmium] electroplating [bath]. L. R. WESTBROOK, Assr. to GRASSELLI CHEM. CO. (U.S.P. 1,818,179, 11.8.31. Appl., 23.2.28).—The bath comprises, per litre, a solution of NaOH 120 g., $\text{Cd}(\text{OH})_2$ 48 g., Na_2SO_4 60 g., $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$ 1 g., and a naphthylaminesulphonic acid 10–15 g.

A. R. POWELL.

Finishing of cadmium-plated goods. C. L. GANSER (U.S.P. 1,816,837, 4.8.31. Appl., 14.3.30).—The plated articles are quickly rinsed in cold H_2O , then immersed for 10–15 sec. in dil. HNO_3 (1 oz. per gal.), washed, and dried.

A. R. POWELL.

Electrodeposition of (A) palladium, (B) metals of the platinum group. A. R. POWELL, E. C. DAVIES, and JOHNSON, MATTHEY & CO., LTD. (B.P. 367,587–8, 12.3.31).—(A) The bath consists of a 3% solution of $[\text{Pd}(\text{NH}_3)_4](\text{NO}_3)_2$ containing 5% of Na_2SO_4 or NaNO_3 and either 1% of NH_3 or 1% of H_3PO_4 ; addition of 0.01% of dextrin or the like produces a brighter deposit. (B) Bright, adherent deposits of Pt, Pd, and Rh, either alone or as alloys with one another, are obtained by electrolysis of a solution of the sol. double nitrites acidified with H_3PO_4 .

A. R. POWELL.

[Addition agents for] electroplating [baths]. G. LUTZ and L. R. WESTBROOK, Assrs. to GRASSELLI CHEM. CO. (U.S.P. 1,818,229, 11.8.31. Appl., 23.2.28).—The addition of small quantities of alkyl- (*e.g.*, propyl-) naphthalenesulphonic acids or their Na salts to Zn, Ni, or Cd sulphate or cyanide plating baths produces hard, bright, mirror-like deposits.

A. R. POWELL.

Furnaces, kilns, etc. Ovens for heat-treating metals. Insulation on steel etc.—See I. **Coated porcelain. Tools.**—See VIII. **Coating radio-valve filaments.**—See XI. **Anti-rust composition.**—See XIII.

XI.—ELECTROTECHNICS.

Coal-tar pitch.—See II. **Determining C in steel. Corrosion protection by Cr. Electrodeposition on Al etc.**—See X. **Determining p_H of soils. Electrolytically soluble ions in soil.**—See XVI. **Salometer [and sugar analysis].**—See XVII. **Determining p_H of dough.**—See XIX.

PATENTS.

Coating of substances [radio-valve filaments with alkali or alkaline-earth metals or oxides]. H. S. COOPER and M. MERLUB-SOBEL, Assrs. to KEMET LABS. INC. (U.S.P. 1,818,196, 11.8.31. Appl., 20.9.27).—The wire is dipped in a solution of Ba or similar metal in liquid NH_3 and exposed to the air to allow the NH_3 to evaporate and the Ba to oxidise to BaO .

A. R. POWELL.

Composition of matter. [Electrical insulation and friction material.] L. McCULLOCH, Assr. to WESTINGHOUSE ELECTRIC & MANUFACTURING CO. (U.S.P. 1,821,390, 1.9.31. Appl., 31.5.30).—Asbestos fibres, which may be bonded with org. binders (nitrocellulose, dextrin, starch, etc.), are impregnated with aq. $\text{Cr}_2(\text{SO}_4)_3$ and heated at $150\text{--}300^\circ$ at least partly to dehydrate the sulphate.

L. A. COLES.

[Pole bridge for] electric accumulators. BRITANNIA BATTERIES, LTD. (B.P. 369,700, 21.1.31. Ger., 21.1.30).

(A) [Slit sheet-metal] grids or plates, (B) [rubber separators], for electric accumulators. E. T. WILLIAMS, H. SALMON, and EXPANDED METAL CO., LTD. (B.P. [A] 369,605 and [B] 369,612, 22.12.30).

Control of temp. etc. Gas filter. Treatment of gases and liquids. Initiating chemical reactions. Friction-resisting surfaces.—See I. Aliphatic aldehydes. Prep. of org. thiocyno-derivatives.—See III. Articles containing Cu protoxide. Deoxidiser for air in transformers etc.—See VII. Cu-coated porcelain.—See VIII. Linings for induction furnaces. Cu-coated steel wire. Magnetic metals etc. Ag-Be. Mg. Electrodeposition of metals. Electrodeposition of Zn. Cu. Cd. Cd-plate. Plating Pt-group metals. Electroplating.—See X. Resinous insulators.—See XIII. Insulating material.—See XIV.

XII.—FATS; OILS; WAXES.

Colour reaction of Japanese acid clay with carotene in palm oil. K. KOBAYASHI, K. YAMAMOTO, and J. ABE (J. Soc. Chem. Ind., Japan, 1931, 35, 35—41 B; cf. A., 1930, 258; 1932, 203).—Japanese acid clays (like fullers' and Florida earths and acid-activated clays) acquire a blue-green colour when treated with (10%) solutions of palm oil or carotene in C_6H_6 , light petroleum, CS_2 , CCl_4 , or $CHCl_3$ (in Et_2O , MeOH, and $COMe_2$ no colour is produced); the reaction resembles that of dehydrating agents, e.g., H_2SO_4 , $SbCl_5$, on the oil. Absorption spectra of the solutions of the oil or carotene show three maxima, two of which are reproduced by the pigment which is recovered from the coloured clay by extraction with EtOH (this solvent is evaporated and replaced by C_6H_6). The colour reaction, which appears to be due to polymerisation, is reproduced on fresh clay by the extracted pigment, which probably is carotene, the original pigment of the oil.

E. LEWKOWITSCH.

Acidity of castor oil. (MLLE.) M. T. FRANÇOIS (Compt. rend., 1932, 194, 731—733).—Free fatty acids present in castor oil are retained by the neutral glycerides since they cannot be removed by fractional crystallisation, ultrafiltration, steam-distillation, or fractional dissolution in light petroleum, and are only partly removed by absorbents such as charcoal or infusorial earths. Ricinoleic acid after keeping for 20 months, exact neutralisation, and extraction with Et_2O affords a neutral substance, probably obtained by internal esterification between the alcohol and acid fractions of the mol. J. W. BAKER.

Chemical study of rancidity. I. Autoxidation of shortenings and crackers. H. O. TRIEBOLD and C. H. BAILEY (Cereal Chem., 1932, 9, 50—64).—The controlled-acidity method of Holm and Greenbank (B., 1923, 1138 A) has been used to study the oxidation of various shortenings and adapted and applied to crackers. Assuming that the length of the induction period (the period elapsing before a measurable O_2 absorption appears) represents the susceptibility of a shortening to oxidative rancidity, maize oil, cottonseed oil, and their compounds exhibit the poorest keeping qualities, prime steam lard is slightly better, open-kettle lard better still, all-hydrogenated shortenings and oleo-oils are very good, and coconut oil is probably best of all. The absorption of O_2 by animal shortenings appears to be an autocatalytic process, whereas vegetable fats show a comparatively long period of slow

absorption before the autocatalytic stage is reached. This is due apparently to the presence of an inhibitor in the latter. Keeping quality of crackers is generally related to the length of the induction period of the shortening, with a considerable proportion of exceptions. It is more closely related to the induction period of the crackers themselves. W. J. BOYD.

Wood taint in butter. Strawberry ice-cream. Cheese analysis.—See XIX.

PATENTS.

Saponification. V. R. KOKATNUR (U.S.P. 1,813,454, 7.7.31. Appl., 23.4.25).—Fats are saponified with anhyd. alkali, or by the Twitchell method, in the presence of an inert org. diluent (preferably a fat solvent, e.g., kerosene), which does not dissolve glycerin, but may be distilled off with it during the saponification.

E. LEWKOWITSCH.

Recovery of oil from whale blubber and other like materials. E. OLSEN (B.P. 368,655, 17.8.31).—The blubber is digested with pressure steam (without agitation) in a no. of digestors, and the oil and gelatinous liquors formed are collected as formed, in a common settling tank, from which the oil is continuously or periodically removed at the top, and the aq. liquors are withdrawn when a certain level has been reached.

E. LEWKOWITSCH.

Cetyl alcohol. M. A. YOUTZ, ASST. to STANDARD OIL Co. (U.S.P. 1,814,654, 14.7.31. Appl., 1.8.27).—Spermaceti is saponified and the cetyl alcohol is extracted by, e.g., light petroleum from the aq. saponification mixture which contains < 40 vol.-% of EtOH or MeOH.

E. LEWKOWITSCH.

Manufacture of wax-like substances. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 368,425, 17.12.30. Cf. B.P. 367,339; B., 1932, 436).—Wax-like substances for polishes etc. are prepared by displacing the alcoholic groups of natural waxes (carnauba, montan) by other alcoholic groups by heating with alcohols (e.g., of relatively low mol. wt.) at temp. $> 100^\circ$.

H. E. BLAYDEN.

Kibbler for soap etc.—See I. Lubricants.—See II. Preserving oxidisable compounds.—See III. Preps. for treating textiles etc.—See VI. Oxidisable org. compounds.—See XIV.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Analysis of red lead and lead peroxide. N. BUSVOLD (Chem.-Ztg., 1932, 56, 106—107).—The finely-ground sample (5—10 g.) is shaken with 20—40 c.c. of dil. (1:1) HNO_3 , 50—100 c.c. of H_2O are added, and the suspension is titrated with H_2O_2 (10 c.c. of 30% H_2O_2 diluted to 250 c.c.) until the brown colloidal PbO_2 has completely dissolved. Back-titration with $KMnO_4$ should not be necessary. A. R. POWELL.

Fe_2O_3 pigment.—See XIV.

PATENTS.

Varnishes and like coating materials. NIPPON PAINT KABUSHIKI KAISHA, and T. SHONO (B.P. 368,359, 30.10.30).—A phenol and formalin are condensed in the presence of alkali at room temp. (3—4 weeks) and neutralised, and the condensation is continued in the

presence of, *e.g.*, HCl at 40° for 20 min.; the product is chilled in ice water, pulverised, washed, and dissolved in a solvent (*e.g.*, EtOH-BuOH), mineral acid being added just before the coating operation in order to complete secondary condensation. E. LEWKOWITSCH.

Cellulose ester coating compositions. H. LANGWELL, and DISTILLERS Co., LTD. (B.P. 367,390, 18.11.30).—> 20 wt.-% of paraldehyde (as diluent or latent solvent) together with an alcohol, ketone, or ester as activator therefor, is incorporated in such compositions. S. S. WOOLF.

Anti-rust coating compositions. W. W. GROVES. From I. G. FARBENIND. A.-G. (B.P. 369,242, 8.11.30).—Mixtures of aq. bitumen dispersions prepared by means of insol. humic or lignic acid, or insol. salts of these, with known anti-rust pigments, *e.g.*, Fe₂O₃, Pb₃O₄, and, if desired, linseed oil or a varnish as hardener, are claimed. S. S. WOOLF.

Manufacture of body colours for coating leather. O. DÖRR and M. HOFMANN (DÖRR & HOFMANN) (B.P. 369,260, 6.11.30. Ger., 7.11.29).—Such products contain one or more polymerised vinyl compounds together with other film-forming bases, *e.g.*, cellulose nitrate, differing among themselves and from the vinyl compounds in viscosity, if desired. Improved lustre is claimed. [Stat. ref.] S. S. WOOLF.

Joining [cellulosic] surfaces or articles. CELLULOID CORP. (B.P. 367,515, 12.1.31. U.S., 11.1.30).—Composite sheets or articles, one or more components of which are cellulosic plastics, are joined by means of a solid composition comprising substantially non-volatile solvents or plasticisers for the cellulose derivative, *e.g.*, acetate, forming the basis of the plastic. If desired, the jointing compound may also contain the cellulose derivative, in which case at least 60 pts. of plasticiser should be present per 100 pts. of cellulose derivative. S. S. WOOLF.

Manufacture and use of synthetic resins. BRIT. CELANESE, LTD. (B.P. 368,801, 7.11.30. U.S., 7.11.29).—A dihydroxybenzene, *e.g.*, resorcinol, is condensed at raised temp. with a ketone, *e.g.*, COMe₂, COMeEt, cyclohexanone, in the presence of a, preferably strong, acid catalyst, *e.g.*, HCl, H₂SO₄, H₃PO₄. The resulting resin may be incorporated with cellulose acetate etc. for use, *e.g.*, as adhesive for reinforced glass. S. S. WOOLF.

Manufacture of synthetic resins. N. J. L. MEGSON and E. L. HOLMES (B.P. 368,966, 27.2.31).—A phenol, *e.g.*, PhOH, paraformaldehyde or its equiv., a polyhydric alcohol, *e.g.*, glycerol, and a polybasic acid or its anhydride, *e.g.*, phthalic anhydride, are heated together, *e.g.*, for 9 hr. at 185°, in the absence of catalysts. S. S. WOOLF.

Preparation of resin solutions. BAKELITE GES.M.B.H. (B.P. 368,807, 3.12.30. Ger., 4.12.29. Addn. to B.P. 295,335; B., 1930, 469).—The initial phenol-aldehyde condensation (both reactants being in the anhyd. form) is carried out in the presence of the solvents for "resitol" resins specified previously. Further quantities of phenol and aldehyde may be added progressively, if desired. The heating is continued until substantially all reacting materials are converted into "resitols." [Stat. ref.] S. S. WOOLF.

Production of electrical insulating material from resins. E. MOSSGRABER (B.P. 367,874, 24.10.30. Ger., 24.10.29).—The resin, *e.g.*, colophony, is dissolved in EtOH containing 10% NaOH and the solution is heated with an acid chloride, *e.g.*, AcCl, whereby EtOAc distils off, leaving a residue of NaCl and the anhydride of the resin acid. The latter forms a valuable insulating varnish. A. R. POWELL.

Manufacture of artificial masses. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 369,313, 14.1.31).—An aldehyde, *e.g.*, CH₂O or its polymerides, is condensed with a polymeric alcohol, the unsaturated monomeric form of which contains a chain of > 2 C atoms (*e.g.*, alcohols produced by reducing polymeric Me vinyl ketones, polymeric acraldehyde, etc., or by hydrolysing polymeric Me vinylacetates), in the presence of an acid catalyst, *e.g.*, HCl, NaHSO₄, NaH₂PO₄, and, if desired, solvents and/or diluents, *e.g.*, H₂O, glacial AcOH, COMe₂. S. S. WOOLF.

Plastic compositions. BRIT. CELANESE, LTD. (B.P. 369,294, 24.12.30. U.S., 16.1.30).—The plasticity of compositions, in sheet or other form, containing a cellulose derivative, *e.g.*, the acetate, with plasticisers and swelling agents therefor, *e.g.*, triacetin, BuOAc, EtOH, is increased by treatment with a hydroxycarboxylic acid or ester, *e.g.*, Bu tartrate. Such plastics are suitable for use in reinforced glass. S. S. WOOLF.

Manufacture of olefine polysulphide plastics. J. C. PATRICK (B.P. 369,097, 18.6.31. U.S., 8.8.30).—An olefine compound, *e.g.*, a dihalide, is caused to react with a solution of a polysulphide, *e.g.*, Na₂S₄₋₅, in the presence of a dispersing agent, *e.g.*, freshly pptd. Mg(OH)₂, and a H₂O-peptisable protein as protective colloid, *e.g.*, egg-albumin, and the resulting plastic is coagulated. [Stat. ref.] S. S. WOOLF.

Masses suitable for manufacture of records for sound reproduction. CONSORT. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 368,621, 8.6.31. Ger., 7.6.30).—Records are pressed from a powdered mixture (preferably combined in solution and evaporated) of a cellulose ester and a polyvinyl ester, with a softening agent, fillers, etc. as required. E. LEWKOWITSCH.

Dental impression compositions. ASSOCIATED PRODUCTS, LTD., and H. OSBORN (B.P. 368,622, 8.6.31).—The masticated material consists of a synthetic aldehyde resin ("Wacker shellac," 100 pts.) with 70 pts. of a fatty acid mixture (stearic acid with, *e.g.*, coconut oil fatty acids or olive oil), a brittle wax (*e.g.*, shellac wax, 1-1½ pts.), and a powdered resin (*e.g.*, copal or dammar, 4 pts.) from which volatile constituents have been removed. The product is plastic at 72-83°, of a gutta-percha consistency at 50°, and rigid below 36°. E. LEWKOWITSCH.

Azo pigments.—See IV. **Resins from wood pulp.**—See V. **Coating of metal articles.** **Soldering flux.**—See X. **Ivory scrap.**—See XV.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Impure iron oxide as a rubber pigment. I. **Effect of ferric sulphate on cure [vulcanisation] and ageing of rubber.** II. **Cause of aggregation**

and poor dispersion of iron oxide in rubber. J. W. AYERS (Ind. Eng. Chem., 1932, 24, 320—324).— Fe_2O_3 as produced by calcining FeSO_4 invariably contains a small % of $\text{Fe}_3(\text{SO}_4)_3$. Increase in the proportion of $\text{Fe}_2(\text{SO}_4)_3$ leads to retardation of vulcanisation and to depreciation in the ageing qualities of the product. This effect can be prevented by pretreatment of the impure Fe_2O_3 with Na_2CO_3 , washing, and drying. In the presence of $\text{Fe}_2(\text{SO}_4)_3$ the particles of Fe_2O_3 are aggregated with consequent loss in pigmenting val. because the aggregates resist disruption during the rubber-mixing process. D. F. TWISS.

Chloroform extraction of vulcanised rubber. K. HADA and T. NAKAJIMA (J. Rubber Soc. Japan, 1931, 3, 1—6).—Soft and hard rubbers (composition recorded), compounded respectively with pitch and mineral rubber, were examined. The presence of these substances retarded vulcanisation of soft, and accelerated that of hard, rubbers. Extraction of the COMe_2 -extracted soft rubbers with CHCl_3 caused depolymerisation, which was partly prevented by pitch or mineral rubber. Extraction of soft rubbers was incomplete even after 16 hr. Both rubbers became insol. in COMe_2 after vulcanisation. Extraction of COMe_2 -extracted hard rubbers with CHCl_3 did not cause depolymerisation.

CHEMICAL ABSTRACTS.

Effects of mixed solvents on extraction of raw and vulcanised rubbers. S. SAITO (J. Rubber Soc. Japan, 1931, 3, 211—219).—With vulcanised rubber the CHCl_3 extract was 1.2—3.2 times greater than the COMe_2 extract. COMe_2 extracted 0.019% and CHCl_3 0.043% of free S. Extraction by mixed solvents was studied.

CHEMICAL ABSTRACTS.

PATENTS.

Manufacture of vulcanised froth or foam from india-rubber, gutta-percha, and balata. SOC. BELGE DU CAOUTCHOUC-MOUSSE (B.P. 367,811, 14.8.30. Fr., 27.9.29).—The shaped article is enclosed in a permeable mould or embedded in a container filled with an inert dry powder, e.g., sand-talc mixture, and is then heated in an autoclave for vulcanisation, gas being introduced during this heating so as to raise the pressure above 300 atm. After the autoclave has cooled and the rubber solidified, the gas pressure is released. The vulcanised rubber foam thus obtained is of uniform texture and the pressure of the gas retained in the cells may attain 5 atm. Sheets of rubber foam are obtained by laying the prepared sheet of raw "compound" on a length of flexible material, e.g., paper or metal, rolling the double layer into a spiral, and subjecting to heat and pressure as described. The "compound" used desirably includes rubber with balata or gutta-percha, with vulcanising agents, colours, softeners, etc., and 5—25% of waxy or resinous constituents on the total. D. F. TWISS.

Manufacture of moulded articles of rubber. SOC. ITAL. PIRELLI (B.P. 352,829, 30.9.30. Italy, 1.10.29).—Transmission belts, solid or semi-pneumatic tyres, etc. are shaped by heat under confinement, e.g., at 70—90°, in a mould or press; the required degree of vulcanisation is then effected by heating in the free condition in a liquid medium such as H_2O under a pressure greater than that of saturated steam at the vulcanising temp. D. F. TWISS.

Manufacture of [rubber] insulating materials. W. S. SMITH, H. J. GARNETT, and J. N. DEAN (B.P. 367,851, 20.11.30).—Material, suitable for a submarine signalling cable, e.g., purified gutta-percha and/or balata, is preserved against oxidation by incorporating an antioxidant, e.g., tannin, which has been so purified that with H_2O it yields a solution of low electrical conductivity. D. F. TWISS.

Manufacture of vulcanisation accelerators and vulcanisation of rubber. RUBBER SERVICE LABS. Co., Assecs. of O. BEHREND (B.P. 367,840, 25.11.30. U.S., 18.12.29).—A chlorinated aldehyde-amine product, preferably derived from an aliphatic aldehyde below C_8 , e.g., $\text{C}_3\text{H}_7\text{-CHO}$ (3 mols.), and an aromatic amine, e.g., NH_2Ph (1 mol.), is condensed with mercaptobenzthiazole, or a homologue or salt thereof, by heating equimol. proportions in alcoholic solution, e.g., at 50°.

D. F. TWISS.

Oxidisable org. compounds.—See III. **Belting.**—See V. **Rubberised fibres.**—See VI.

XV.—LEATHER; GLUE

Chrome tanning. I. Rôle played by sodium chloride in chrome-[tanning] liquors on chrome tanning. E. R. THEIS and A. W. GOETZ (Ind. Eng. Chem., 1932, 24, 304—307).—The amount of acid removed from pickled skin by drumming it in aq. NaCl increased and the vol. of the skin decreased as the concn. of the solution was increased. The effect was more marked in solutions more dil. than 6%. The amounts of Cr_2O_3 absorbed by pelt from various chrome-tanning liquors containing NaCl diminished as the concn. of NaCl was increased, the effect being small in solutions containing 0.3825% Cr_2O_3 and much greater in those with $\leq 0.765\%$ Cr_2O_3 . The effect of NaCl additions was most marked with concns. up to 10% and was practically nil above that figure. The colour of the tanned skin was brightened and the grain rendered more drawn by increases in the NaCl concn. of the chrome-tanning liquors. The strength of the finished leather was increased by additions of NaCl up to 10% concn. and slightly diminished by further additions. The % of fat absorbed by the leather from the fat liquor was unaffected by the NaCl concn. of the tan liquor in which it had been tanned.

D. WOODROFFE.

PATENTS.

Utilisation of ivory scrap. E. BORMANS (B.P. 369,252, 16.12.30).—"Phenic ivory," prepared by heating ivory scrap with PhOH and steam at 60 lb., is heated with PhOH , CH_2O , and aq. NH_3 to yield a pasty condensation product which, after admixture with ZnO , is moulded and hardened by heat and pressure.

L. A. COLES.

Preps. for treating leather.—See VI. **Colours for leather.**—See XIII.

XVI.—AGRICULTURE.

Soils of the Nile and Gash. VII. P. VAGELER and F. ALTEN (Z. Pflanz. Düng., 1932, 24A, 50—92; cf. A., 1932, 249).—Composition and nutrient vals. of various soil types are recorded with special reference

to their Na content. Ameliorative treatment is discussed. A. G. POLLARD.

Soil profile studies. IV. Morphological and chemical evidence of podsolisation. J. S. JOFFE (Soil Sci., 1932, 33, 217—237; cf. B., 1931, 1149).—The distribution of bases, base-exchange capacity, and the sesquioxide, SiO_2 , alkaline-earth, P, and Mn contents of various horizons are recorded and discussed in the light of the processes involved in podsolisation. The rate of podsolisation of soils carrying different vegetation is examined. A. G. POLLARD.

Vineyard soils. G. HAGER (Z. Pflanz. Düng., 1932, 11B, 97—108).—The assimilable K and P contents of soils at various depths are recorded. The % of stones in soil is emphasised as having great significance in the consideration of nutrient vals. The vine is not particularly sensitive to changes in soil reaction. Appropriate manurial treatment for vineyards is discussed. A. G. POLLARD.

Aggregating action of frost on soils. E. JUNG (Z. Pflanz. Düng., 1932, 24A, 1—20; cf. B., 1931, 454).—Microscopical examination indicates two phases in the freezing of soils: (a) the freezing of the soil solution, (b) the homogeneous solidification of the whole soil mass. Dilatometric measurements show that the phase equilibrium, ice- H_2O , depends on temp., H_2O content, and the binding power of the soil for H_2O . The latter factor allows only a qual. grouping of soils, since the proportion of "unfrozen" H_2O at a given temp. varies with the total H_2O content. A. G. POLLARD.

Effect of temperature on nitrogen fixation [in soils] by *Azotobacter*. R. A. GREENE (Soil Sci., 1932, 33, 153—161).—Various species of *Azotobacter* fix max. amounts of N at different temp. An individual species may become acclimatised to environmental conditions and show optimum activity at different temp. A. G. POLLARD.

Formation of calcium acetate gel in soils and clay suspensions by an exchange reaction. E. UNGERER (Z. Pflanz. Düng., 1932, 24A, 31—33; cf. A., 1932, 334).—Exchangeable Ca^{++} in clay and soils reacts with EtOH solutions of alkali acetates to produce gels of $\text{Ca}(\text{OAc})_2$. The rigidity of the gel is a measure of its Ca content. The reaction is sensitive and will indicate quantities $> 0.03\%$ Ca. A. G. POLLARD.

Factors affecting the amount of electro-dialysable ions liberated from some soils. A. LÖDDESÖL (Soil Sci., 1932, 33, 187—209).—The initial rate of removal of cations from soil by electro-dialysis is greater in more dil. suspensions, but the total amount removed is not affected by concn. Anions are liberated in much smaller amounts and the rate of removal is not appreciably affected by the concn. of suspensions used. Increasing the distance between the electrodes lowers the initial rate of removal of ions. Doubling the voltage applied to the dialyser increases the removal rates in the early stages by approx. 50%. Cellophane is preferable to parchment as a membrane. The amount of total base removed from soils by electro-dialysis and by NH_4OAc leaching show good agreement when correction is made for material becoming sol. during the leaching process. A. G. POLLARD.

Measuring soil colour. C. F. SHAW (Soil Sci., 1932, 33, 183—185).—Soil suspension is thickly painted on filter-paper, dried, and the colour matched in a rotary colorimeter (Rept. Soil Colour Stand. Comm. Amer. Soil Survey Assoc., 1924—1927, Bulls. 6—9).

A. G. POLLARD.

Ultrafilter [for soils]. W. HOFMANN (Z. Pflanz. Düng., 1932, 24A, 33—38).—The use of the Zsigmondy ultrafilter in determinations of SiO_2 in soils is described. Other forms of filter are less satisfactory.

A. G. POLLARD.

Determination of nitrates in soils containing soluble organic matter. M. J. PLICE (Soil Sci., 1932, 33, 213—215).—The presence of much org. matter in soil extracts vitiates the use of the phenoldisulphonic acid method for NO_3^- determinations. To obviate this the soil extract is made in the customary manner, but without the use of any pptg. agent. After filtration 0.5 g. of $\text{Ca}(\text{OH})_2$ is added per 100 c.c. After several minutes the mixture is filtered. Should any colour remain the solution is evaporated to dryness, approx. 0.5 c.c. of aq. NH_3 (1:1) is added, and the dish retated till all the residue is wetted. Org. matter is removed by adding 5—15 drops of H_2O_2 . Coloration due to Mn or Fe may still persist, but does not affect the accuracy of the analysis. A. G. POLLARD.

Time of observation of quinhydrone-electrode potential in determining p_{H} values of soils. G. A. HATOS (Z. Pflanz. Düng., 1932, 24A, 44—49).—The freshly ignited electrode placed in aq. quinhydrone for 15—30 sec. prior to immersion in the soil suspension attains const. potential in 5 sec. A. G. POLLARD.

Sorption phenomena in soils and in silica gels. E. D. DE PARAVICINI (Soil Sci., 1932, 33, 163—181).—Conductivity and p_{H} measurements show that the "sorption" of ions (total removal from solution) from neutral salt solutions by soils and SiO_2 gel is much greater than that accounted for by base exchange. Equilibrium is attained immediately. There is preferential displacement of H^+ by cations, but in H-soils and SiO_2 hydrogel there is equiv. sorption of Na^+ , K^+ , Mg^{++} , and Ca^{++} . Preheating soils increases their acidity and the conductivity of their aq. suspensions, max. effects being obtained at optimum temp. between 110° and 150° . For SiO_2 gels the effects are reversible. In the removal of ions from neutral salt solutions, two processes occur: the initial reaction is one of base exchange; the second, and larger, is the removal (adsorption) of the whole salt mol. A. G. POLLARD.

Effect of ammonium sulphate on soil reaction. J. W. WHITE (J. Amer. Soc. Agron., 1931, 23, 871—877).— $(\text{NH}_4)_2\text{SO}_4$ increased soil acidity in proportion to the equiv. of 1 mol. of dibasic acid per mol. A method for the determination of CaO requirement is described.

CHEMICAL ABSTRACTS.

Comparative effects of concentrated nitrogenous fertilisers on permanent soil acidity. F. E. ALLISON (J. Amer. Soc. Agron., 1931, 23, 878—908).—In the absence of a crop the acidity which develops is theoretically the sum of that due to the (combined) mineral acids (H_2SO_4 , HCl , H_3PO_4) added plus that caused by HNO formed in the soil. Added H_2CO_3 , HNO_3 , and

HNO_3 usually had no appreciable effect. In presence of a crop, complete absorption of N by the plants being assumed, the only appreciable direct source of permanent acidity which can be attributed to the N fertiliser is that caused by H_2SO_4 , HCl , or H_3PO_4 . Addition of Na, K, Ca, or Mg nitrate renders the soil more basic. Regardless of whether a given crop is fertilised with acid-producing or base-producing N fertilisers the proportion of bases to acids in the ash does not vary greatly. Whether N enters the plant as NH_3 or NO_3^- the final effect is as though the free ions enter. In calculating comparative acidity vals. for soils treated with N fertilisers a correction must be applied for the bases removed by the growing plants. Under humid conditions the loss of bases due to N fertilisers is small compared with that through leaching.

CHEMICAL ABSTRACTS.

Use of iron blast-furnace slag in agriculture.

H. KAPPEN (Arch. Eisenhüttenw., 1931—2, 5, 441—448).—The finely-ground slag is just as efficient as limestone for counteracting the acidity of soils and in many cases its use results in greater yields although it is slower than CaCO_3 in its neutralising action. Slag dressings improve the physical properties of soils, especially light soils, but have not quite such a beneficial biological action as has CaCO_3 . The beneficial action of these dressings is attributed to the high content of readily assimilable SiO_2 the presence of which in the soils hardens the plants and increases their resistance to attack by fungoid growths. The best results are obtained with slags containing 40—50% CaO ground to the same degree as basic slag.

A. R. POWELL.

Mineral fertilisers for potatoes. L. I. KOROLEV (Udobr. Urozhai, 1931, 3, 559—606).—The podsol zone responds best to mineral fertilisers; chernozem soils respond only slightly. $(\text{NH}_4)_2\text{SO}_4$, urea, and CaCN_2 are effective; with NH_4Cl the starch content is lowered. All K salts are effective.

CHEMICAL ABSTRACTS.

Manurial trials with potash in field and pot cultures. F. MÜNTER (Z. Pflanz. Düng., 1932, 11B, 118—131).—In pot trials with cereals, kamit, in spite of its initial inhibitory effect, produced generally better yields than KCl, K_2SO_4 , K Mg sulphates, or 40% K salts. Lower yields from the fertilisers containing Cl were accentuated in acid soils. Injurious effects due to the greater total salt content of these materials are suggested. Among various combined K-N fertilisers for potatoes, $\text{K}_2\text{SO}_4 + \text{NaNO}_3$ was the most successful on both neutral and acid soils. On neutral soils $\text{K}_2\text{SO}_4 + (\text{NH}_4)_2\text{SO}_4$ was equally successful and "Nitrophoska" gave good results on soils of p_{H} 5.1. In field trials heaviest potato yields were obtained with 40% K salts + NaNO_3 . Misleading results of manurial trials in pot cultures may result if plants are not allowed to attain maturity.

A. G. POLLARD.

Cataphoretic determination of the fertiliser requirement of soil. A. REIFENBERG (Z. Pflanz. Düng., 1932, 24A, 20—30).—A modification of the cataphoretic process for determining colloidal matter in soils is applied to the determination of K and P in both the dissolved and adsorbed conditions. Results show good agreement with those of Neubauer tests.

A. G. POLLARD

Importance of air content and subsoil-water level on the yield of meadows on low-moor soils.

R. REINCKE (Z. Pflanz. Düng., 1932, 11B, 109—118; cf. A., 1931, 708).—Pore space in low-moor meadow soils decreases with advancing stages of decomp. The air content is of prime importance for the growth of plants, good meadows having >20% in summer and poor meadows approx. 10%. High ground- H_2O level does not necessarily involve a low air space. Highly decomposed soils lose their air content more readily as a result of rising H_2O level than do newer soils. A. G. POLLARD.

Effect of plant nutrition on composition of wheat.

H. R. KRAYBILL (Cereal Chem., 1932, 9, 71—82).—Long periods of maturity, abundant moisture, and low temp. produce a low-protein wheat by favouring a greater abundance of carbohydrates in relation to nitrogenous compounds, and *vice versa*. The application of nitrogenous fertilisers, only in the early stages of development of the plant, increases the supply of carbohydrates by stimulating the vegetative growth, and a high yield of low-protein wheat results. An abundance of N at the heading stage results in a high-protein wheat. The application of PO_4^{3-} , with or without K, decreases the protein content. Although climatic factors are dominant, the use of fertilisers offers a practical means of influencing the quality of wheat. W. J. BOYD.

Hydrolytic acidity of the soil of a sugar-cane plantation.

K. C. W. VENEMA (Arch. Suikerind. Nederl.-Indië, 1931, 39, 922—932).—Determinations of the hydrolytic acidity of 142 samples of soil from the fields of the Sragi sugar-cane plantation, Java, gave figures indicating that this val. has little or no effect on the gross cane yields, but that there is a fairly close connexion between soil acidity and sugar yield and rendement, both of which are visibly decreased as the acidity increases.

J. P. OGILVIE.

Dry substance of pressed [beet] slices of different thicknesses.

F. KRYŽ (Z. Zuckerind. Czechoslov., 1932, 56, 246—248).—Thick and thin slices and also fibrous lumps of beet were found to show the same dry-matter content under the same experimental conditions, the lumps giving the highest vals.; all three, however, reached their max. loss of wt. after the same lapse of time. Based on this observation, a means of rapidly determining the dry-matter content within 0.1% is described.

J. P. OGILVIE.

Occurrence of inferior [beet] roots in [sugar-] factory deliveries.

V. STEHLÍK and J. SOUČEK (Z. Zuckerind. Czechoslov., 1932, 56, 221—246).—Standards to which beets most suitable for sugar manufacture should conform are specified, and germination tests for the estimation of the purity and detection of foreign roots are described.

J. P. OGILVIE.

[Australian] parasitological field trials with sheep.

I. C. ROSS and N. P. GRAHAM (J. Council. Sci. Ind. Res., Australia, 1932, 5, 31—39).—Mortality among sheep caused by *Trichostrongyles* was greatly reduced and wool yield increased by drenching with 1% CuSO_4 solution or with CCl_4 , or dosing with CuSO_4 and Na_3AsO_3 .

A. G. POLLARD.

Sheep blow-fly investigations. Artificial baits. Products of decomposition of wool fibre (keratin).

M. R. FRENEY (J. Council. Sci. Ind. Res., Australia, 1932, 5, 28—30).—Keratin from wool fibre after hydrolysis by Na_2S proved a better attractant than carrion baits. A. G. POLLARD.

Insecticidal activity of aliphatic thiocyanates. I. Aphid. D. F. MURPHY and C. H. PEET (J. Econ. Entom., 1932, 25, 123—129).—Certain aliphatic thiocyanates have a high insecticidal val. A. G. POLLARD.

Toxicity of certain plant extracts to gold fish. N. L. DRAKE and J. R. SPIES (J. Econ. Entom., 1932, 25, 129—133).— COMe_2 extracts of certain species of *Cracca* and *Lonchocarpus* were more toxic than similar extracts of *Derris*. A. G. POLLARD.

Treatment of cotton root-rot with ammonia. D. C. NEAL, R. E. WESTER, and K. C. GUNN (Science, 1932, 75, 139—140).— NH_4 salts check and NH_3 (as gas or in solution) prevents the growth of *Phymatotrichum omnivorum*. Dil. aq. NH_3 is more effective than and preferable to formalin. NaOCl solution does not inhibit growth of the fungus. L. S. THEOBALD.

PATENTS.

Manufacture of fertilisers. LONZA ELEKTRIZITÄTSWERKE U. CHEM. FABR. A.-G. (B.P. 369,240, 17.9.30. Ger., 14.10.29).— $\text{Ca}_3(\text{PO}_4)_2$ is treated with HNO_3 in the presence (or with the subsequent addition before solidification takes place) of NH_4NO_3 and/or KNO_3 , in proportions and under conditions such that the ratio $\text{Ca}_3(\text{PO}_4)_2$: total nitrates in the final product is $\leq 5:1$ and $\geq 2-3$ mols. of H_2O of crystallisation per mol. of $\text{Ca}(\text{NO}_3)_2$ are present. The NH_4NO_3 and/or KNO_3 may be replaced by NH_4 and K salts forming the nitrates by double decomp. with $\text{Ca}(\text{NO}_3)_2$, in quantities such that $>50\%$ of the latter remains undecomposed. L. A. COLES.

Al_2O_3 from siliceous material.—See VII.

XVII.—SUGARS; STARCHES; GUMS.

Studies on [sugar-juice] carbonatation processes in which the scums are returned. IV. Comparison of the Pšenička and Hruđa processes. L. DOSTÁL (Z. Zuckerind. Czechoslov., 1932, 56, 265—268; cf. B., 1932, 203).—Both the above processes (in which a proportion of the carbonatation scums is returned either before or after liming), compared with the usual clarification procedure of the beet factory, gave juice of a better colour. In both the filtrability of the first carbonatation scum juice at the same degree of alkalinity was much improved. J. P. OGILVIE.

Pre-defecation by returning unfiltered carbonatated juice. T. HERKE and N. REMPEL (Deut. Zuckerind., 1932, 57, 18—22).—Results of experiments on returning part of the unfiltered carbonatated juice to the raw juice show economy in CaO and an improved filtration, compared with the ordinary procedure. The amount of milk-of-lime and of unfiltered carbonatated juice must be such as to reach the optimum p_{H} of the raw juice for the deflocculation of its colloids. This is at about p_{H} 10—11, corresponding to an alkalinity of 0.03—0.04% CaO . J. P. OGILVIE.

Effect of molasses on beet-juice clarification. K. ŠANDERA (Z. Zuckerind. Czechoslov., 1932, 56, 364—367).—Laboratory and large-scale experiments are described showing that the addition of molasses to the diffusion juice has a favourable effect on its defecation, though to a rather limited extent, depending on the other conditions of clarification. The rates of subsiding and of filtration, and the colour and purity of the filtered juice, are improved. It is explained that the addition of the molasses affects the electrical charge of the colloids, thus assisting in their coagulation. J. P. OGILVIE.

Teatini process as applied to cane-juice clarification. D. TEATINI (Internat. Sugar J., 1932, 34, 112—113).—Bedding's experiments carried out in Java cannot be regarded as an application of the Teatini process (cf. B., 1932, 203) for the following reasons: (1) mixing at the moment of the introduction of the SO_2 was effected by a jet of CO_2 , which, without providing the desired mixing, gave a sulpho-carbonatation clarification having no resemblance to the Teatini process; (2) the liquid SO_2 was not measured, whereas the dose of SO_2 enormously influences the results, and in any case the SO_2 must not cause the p_{H} to be lowered, as was the case at Poendoeng; (3) the liquid SO_2 was not properly distributed; (4) its amount was much greater than should have been used; and (5) a p_{H} of 10.6—11.0 previous to the introduction of the SO_2 is the optimum. J. P. OGILVIE.

[Sugar-]juice clarification [with fractional defecation]. A. BÖHM (Z. Zuckerind. Czechoslov., 1932, 56, 382—384).—Factory experiments showed that the best results were obtained with a pre-defecation of 0.5% and a main defecation of 1.10% CaO of the roots, the temp. of the diffusion juice being 78° , and that previous to the presses 103° . Less CaO than this gave a lower purity quotient, an inferior colour, slower filtration, and a softer press-cake. Much, however, depends on the quality of the juice. A temp. of 103° gave at the presses a harder, more easily washed cake than a lower one, viz., 97° . J. P. OGILVIE.

Behaviour of sulphites, sulphates, silica, and nitrogen [in beet sugar juice]. F. SOLDNER (Deut. Zuckerind., 1931, 56, 1011—1013).—After thin-juice sulphitation, about 40% of the SO_2 taken up is found to be present in the un sulphured thick-juice, the balance having been converted into SO_3 or separated as incrustations in the evaporators. Of the nitrogenous compounds entering in the raw juice, 63.4% reach the end-products, the remainder having been mostly lost in evaporation and boiling. SiO_2 increases at the clarification stage (a proportion being introduced with the CaO), but at the thick-juice stage it has diminished, a greater or less amount having been deposited as incrustations. J. P. OGILVIE.

Manufacture of white sugar direct from the cane in the "San Pablo" factory of the Argentine Republic. J. PADILLA (Internat. Sugar J., 1932, 34, 54—61).—Raw juice from the mills after passing through vibrating screens is sulphited to an acidity of 0.15—0.185% SO_2 , limed to a slight acidity to litmus, heated to 100° , and filtered without using kieselguhr. Conc. is carried out in quadruple-effect evaporators to 65° Brix,

the syrup thus obtained being employed for pan-boiling without further treatment. Granulated sugar of high quality for direct consumption, a 2nd sugar at 99.5° polarisation, and a third at 99.0° are thus produced. The last two are mixed together, remelted, and filtered, the liquor obtained being boiled to "refined" *pilé*. Neither the granulated sugar nor the *pilé* is inferior to bone-char-refined sugar made in the Argentine, and both keep well on storage. Diagrams are given of the pan work, the "refining" process, and the massecuite purities. J. P. OGILVIE.

Desaccharification [crystallisation]. E. PŠENIČKA (Z. Zuckerind. Czechoslov., 1932, 56, 281—285).—An illustrated description is given of 4 types of apparatus for the systematic cooling of massecuites, one comprising an adaptation of the Mares mixer, provided with cooling (or heating) elements, and another a horizontal rotary crystalliser, somewhat resembling the Lafeuille apparatus, but of cheaper construction. A further simplification of saccharification work is a vac. apparatus in which the entire crystallisation of the massecuite will take place. J. P. OGILVIE.

Crystallisation of [beet-sugar] after-product massecuites. J. DĚDEK (Z. Zuckerind. Czechoslov., 1932, 56, 264).—A reply to Claassen (B., 1932, 364). It is pointed out that in ordinary after-product work the temp. of the massecuite is allowed to fall more or less rapidly according to the position of the crystalliser in the factory. Under these conditions, supersaturation is reached by diluting with H₂O according to the more or less fortuitous fall of temp. But in the new processes, using crystallisers which are rapidly cooled, the temp. can be controlled and supersaturation thus suitably regulated, besides which the efficient stirring continuously brings fresh syrup in contact with the crystals, the formation of false grain thus being precluded, even when the degree of supersaturation is relatively high. J. P. OGILVIE.

Molasses as the source of colour in adsorption determinations. II. Filtration. Influence of p_H . V. MAŠTALÍŘ (Z. Zuckerind. Czechoslov., 1932, 56, 337—344).—Filtration through kieselguhr is considered necessary in clarifying molasses solutions for determining the decolorising power of activated carbons, as is also the adjustment of the reaction. J. P. OGILVIE.

Determination of the molasses content of fodders. C. NEVOLE (Z. Zuckerind. Czechoslov., 1932, 56, 286—288).—Results are given showing that in the case of molasses-oil-cake mixtures it is incorrect to attempt to determine the % of molasses added from the sucrose content of the fodder. Oil-cakes of different origin had sucrose contents (by double polarisation) varying from 2 to 9%, and by the Cu test from 2 to 12%. J. P. OGILVIE.

Glucose decomposition. K. D. DEKKER (Arch. Suikerind. Nederl.-Indië, 1931, III, No. 19, 723—800).—Facts do not confirm the statement made in the older literature that 55° is a crit. temp., below which colourless, harmless lactic acid is formed, and above which are produced the much-feared acids with their coloured Ca salts. It is, however, true that above that temp. the character of the decomp. is more harmful than

below it. Glucose decomp. is greatest in the carbonation process of clarifying cane juice.

J. P. OGILVIE.

The "Salometer" electrical ash apparatus [for sugar products]. W. E. CALLINGHAM (Internat. Sugar J., 1932, 34, 150).—A conductivity apparatus operating on the Wheatstone bridge principle designed for the determination of the ash in sugar-factory and -refinery products is described. Results obtained by it, compared with those found by the ordinary incineration method, show a close concordance. J. P. OGILVIE.

Evaporator-tube deposits. The "Jenkins" dryer.—See I. Corrosion of evaporator tubes.—See X. Soil of sugar-cane plantations. Beet-roots for sugar factories.—See XVI.

PATENTS

Manufacture of sugar. C. SCHWIEGER (A. SCHWIEGER), Assr. to SCHWIEGER CHEM. CO. (U.S.P. 1,815,276, 21.7.31. Appl., 6.9.27. Renewed 7.10.30).—The output of molasses is reduced and that of sugar increased by treating beet or cane juice with (NH₄)₂CO₃ to eliminate sol. Ca salts, and/or by mixing a proportion of centrifugal run-offs or molasses with the juice at an early stage of its purification. *E.g.*, 500 cu. ft. of beet juice, limed as usual at 75—80° for 5—10 min., are treated with 75 cu. ft. of molasses and with 1500 g. of (NH₄)₂CO₃, and after 20 min. doubly carbonated as usual. The filtered juice from the second carbonation may be further treated with 500—1500 g. of (NH₄)₂CO₃, stirred for 20 min., filtered, and evaporated as usual. J. H. LANE.

Conversion of wood into sugar and other products. S. F. ACREE, Assr. to A. B. FOSTER (U.S.P. 1,816,135, 28.7.31. Appl., 10.4.17. Renewed 2.4.21).—Comminuted wood rich in galactans, in particular that of the Western larch, is digested at 70—90° with mineral acid of about 1% concn. The extract, which may be enriched by passing through successive charges of wood in a battery of digesters, contains galactose, galactose-yielding compounds, glucose, etc. The galactose may be fermented by special yeasts, but is preferably oxidised to mucic acid by HNO₃ and HNO₂. By-products such as oxalic and saccharic acids may be recovered. J. H. LANE.

XIX.—FOODS.

Testing wheat varieties for milling and baking quality. C. O. SWANSON and E. H. KROEKER (Cereal Chem., 1932, 9, 10—33).—The experimental milling test and its limitations are discussed. In evaluating bread wheats it is best to study baking performance of new varieties in comparison with old and tested varieties, and also to measure certain characteristics. Two hereditary characteristics are the effects of mechanical modification of the dough and of bromate on baking quality. Varieties which are resistant to the former are easily injured by the latter and *vice versa*. Other characteristics such as behaviour in the high-speed dough mixer as indicated by the watt-meter, and the effect of bleaching on baking quality, should be studied. W. J. BOYD.

Factors that influence the rate of absorption of water by wheat. C. W. FRASER and W. L. HALEY (Cereal Chem., 1932, 9, 45—49).—Variety, time, and temp. affect the amount and rate of absorption of H₂O by wheat immersed in H₂O, but size and condition of kernel are more important factors than is variety. Scouring increases amount and rate of absorption in proportion to the scouring effect. Variation in protein content has little influence. H₂O penetrates to all parts of the kernel in 2—3 hr., but subsequently changes necessary to proper tempering occur.

W. J. BOYD.

Determination of hydrogen-ion concentration of dough; relation of hydrogen-ion concentration to flour grade. P. HALTON and E. A. FISHER (Cereal Chem., 1932, 9, 1—9).—When a Au electrode is placed in a flour-H₂O-quinhydrone mixture the e.m.f. usually shows a drift with time, but readings taken within a few min. of adding the quinhydrone are steady and reproducible. Filtered or decanted extracts do not show drift. With dough the drift is much less than with suspensions, being usually equiv. to 0.01 of p_H between the 15- and 30-min. readings. In view of this drift, however, it is necessary that the time allowed for the dough to attain the temp. of the thermostat after addition of the quinhydrone should be const., 15 min. being convenient. Frequent replating of the electrodes with Au is necessary in order to obtain concordant results with doughs, and between determinations the electrodes should be washed, dried, and "flamed." The amount of quinhydrone used should be 1 wt.-% of the flour. The lower-grade flours with highest ash contents show the greatest changes in p_H as the H₂O content of the mixture is increased (cf. B., 1929, 187).

W. J. BOYD.

Significance of hydrogen-ion concentration in panary fermentation. P. HALTON and E. A. FISHER (Cereal Chem., 1932, 9, 34—44).—The p_H of dough changes little during fermentation and the greater part of the change occurs in the first hr. when gas production is slow. Addition of highly diastatic malt extract and NH₄ phosphate, or of cane sugar, prolongs the period of high gas production, but has little effect on p_H . "Knocking-back" prolongs gas production, also with little effect on p_H . Contrary to bakers' practice, additional knocks-back should be given to doughs which are delayed in their passage to the oven in order to prolong their period of good working.

W. J. BOYD.

Use of certain constituents in breadmaking, with particular reference to the problem of staling. L. H. BAILEY (Cereal Chem., 1932, 9, 65—70).—The author's compression test (*ibid.*, 1930, 7, 340) and Peper's sedimentation test (B., 1926, 418) were used to study the effect of certain constituents in breadmaking on the development of staleness. Dextrinised starch, maize sugar, invert sugar, honey, agar, mayonnaise, vegetable lecithins, CaO₂, and various milk products had no effect. Malt extract, potato flour, and sour dough (lactic bacilli) had in each case a small effect. Bread stored in solid CO₂ for 2 days, and bread stored for 3 days at —10°, resembled fresh bread when thawed, especially in the former case. Storage at 65° for 3

days was less satisfactory, and bread stored at 7° in waxed paper became quite stale in 3 days.

W. J. BOYD.

Separation of diastatic activity from strength in baking tests. L. ELION (Cereal Chem., 1932, 9, 86—88).—Remarks by Jørgensen (B., 1931, 1113) are criticised. It is observed that, since the determination of the strength of a flour is not the only objective of the baking test, sugar should not be added in every case.

W. J. BOYD.

Wood taint in butter. I. Laboratory experiments with *Pinus radiata (insignis)* and Hoop-pine (*A. cunninghamii*). II. Prevention. W. J. WILEY (J. Council. Sci. Ind. Res., Australia, 1932, 5, 5—14, 15—24).—I. Boxes made from *P. radiata* contaminate butter owing to the presence of a slightly volatile oil which is isolated and described. Different and more objectionable oil exists in *A. cunninghamii*. "Water-proof" cellophane wrapping was less permeable to the oils than the customary "parchment."

II. Reasonably good protection was obtained by spraying boxes with a solution containing 50 g. of casein and 7.5 g. of borax in 300 c.c. of H₂O, followed immediately by a 4% CH₂O solution. A. G. POLLARD.

Strawberry ice cream. Source of milk fat as vital factor. P. H. TRACY, H. A. RUEHE, and R. J. RAMSEY (Ice Cream Trade J., 1931, 27, No. 12, 55—56).—The berries contain a substance which catalyses the oxidation reactions of the butter fat; heating the berries retards its action. Attempts to extract oxidase and reproduce the off-flavour with it were unsuccessful. Metallic contamination must be avoided.

CHEMICAL ABSTRACTS.

Standardised cheese and cheese analysis. F. H. McDOWALL (New Zealand Dept. Sci. Ind. Res., Bull. 21, 1930, 19 pp.).—The permissible divergence of the fat content of cheese as % of H₂O-free solids found by different analysts has been determined. The possible errors due to the method of taking and preparing the sample and the method of analysis have been worked out. The Werner-Schmidt, Babcock, and Gerber methods for fat determination are compared, whilst various methods of moisture determinations in which time and temp. have been varied are compared with a vac. method. It is shown that determinations under factory conditions, when only one test on one vat is made, are liable to a total divergence of 4.5%.

E. B. HUGHES.

Proximate composition of fresh fruits. C. CHATFIELD and L. I. McLAUGHLIN (U.S. Dept. Agric., Circ. 50, 1931, 19 pp.).—A revised edition of a circular published in 1928 (cf. B., 1929, 535).

Corrosion of metals by milk.—See X. **Rancidity in shortenings etc.**—See XII. **Determining molasses in fodder.**—See XVII. **Santonin-chocolate preps.**—See XX. **Dairy waste-waters.**—See XXIII.

PATENTS.

Filter-plates for [cocoa pot-]presses. M. MICHEL (B.P. 368,301, 1.12.30).—A plate for an expressing filter is formed of several layers of permeable material having the finest apertures furthest from the material being

pressed; the filter is protected on the inside, and preferably on both sides, by means such as rivet heads, plain or serrated strips in one layer, or in two layers forming a grid. B. M. VENABLES.

Devices for the conditioning and drying of cereals. GEHR. BUHLER, and R. GAUDARD (B.P. 369,048, 29.4.31. Ger., 14.5.30).

[Domestic] homogenising apparatus [for cream etc.]. N. BENDIXEN and J. C. VREDENBURG (B.P. 368,809, 5.12.30).

[Cattle-feed] grinder. Attrition mill [for flour].—See I. Fibrous vegetable materials [as feed].—See V.

XX.—MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Determination of santonin in preparations of santonin with chocolate. H. DEGNER (Pharm. Presse, 1931, 115; Chem. Zentr., 1931, ii, 3131).—The sample is extracted with Et_2O ; 0.5 g. of solid paraffin is added to the residue, which is boiled with 80% EtOH (50 g.). The residue on filtration is again boiled with EtOH and filtered, the filtrates being shaken with light petroleum (15 g.). The EtOH solution, freed from petroleum, is neutralised with 0.1N-NaOH, treated with 10 c.c. of 0.1N-NaOH, boiled for 20 min., and titrated against HCl. A blank determination is necessary. 1 c.c. of 0.1N-NaOH = 0.0246 g. ($\pm 2\%$) of santonin.

A. A. ELDRIDGE.

Org. S compounds.—See III.

PATENT.

Production of soluble salts of certain barbituric acids. E. LILLY & Co., Assées. of H. A. SHONLE (B.P. 365,135, 16.8.30. U.S., 19.8.29).—Alkali or alkaline-earth metal, NH_4 , or suitable amine salts are prepared from barbituric acids carrying in position 5 an Et or allyl group and a saturated *sec.* alkyl or cycloalkyl group of C_4 — C_7 . Barbituric acids described are: 5-ethyl-5- γ -amyl, m.p. 127—129°; 5-ethyl-5-cyclopentyl, m.p. 181—183°; 5-ethyl-5- β -hexyl, m.p. 122.5—124.5°; 5-ethyl-5- δ -heptyl, m.p. 156—158°; 5-allyl-5- β -amyl, m.p. 80—83°; 5-allyl-5- γ -amyl; 5-allyl-5-cyclopentyl, m.p. 162—164°. The Et malonates from which the first 4 are prepared have b.p. 110—112.5°/4 mm., 123—124°/5 mm., 120—128°/5.5 mm., 127—133°/10 mm., respectively. Other Et malonates described are: β -amyl, b.p. 103—105°; γ -amyl, b.p. 100—103°/3 mm.; cyclopentyl, b.p. 113—115°/4 mm.; the corresponding monosubstituted barbituric acids have m.p. 164—166°, 165—168°, and 221—223°, respectively. Na, Li, NH_4 , NH_2Me , NH_2Et , NHEt_2 , Ca, and Mg salts of the disubstituted barbituric acids are described. [Stat. ref.] C. HOLLINS.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

PATENTS.

Development of [azo] photographic copying paper. KALLE & Co. A.-G. (B.P. 369,024, 9.4.31. Ger., 9.4.30).— NH_3 gas is produced by a const.-feed device

which supplies aq. NH_3 on to a small evaporating heater. J. LEWKOWITSCH.

Production of mono- or multi-coloured prints. F. LIEG (B.P. 353,819, 24.6.30).—Dyes which are capable of forming stable chemical combinations with gelatin are imbibed by a gelatin relief, the combination being broken up by contact with chemically prepared printing paper. Special basic dyes are most suitable, and the emulsion employed should be one prepared ammoniacally. J. LEWKOWITSCH.

Production of photographic colour pictures [on lenticular film]. I. G. FARBENIND. A.-G. (B.P. 368,970, 28.2.31. Ger., 28.2.30).—The widths of the colour strips of the lens filter bear a prescribed ratio to the diam. of each lenticular element. J. LEWKOWITSCH.

Photographic film-pack casing. I. G. FARBENIND. A.-G. (B.P. 369,803, 5.6.31. Ger., 5.6.30. Addn. to B.P. 338,787).

Initiating chemical reactions.—See I.

XXII.—EXPLOSIVES; MATCHES.

PATENT.

Explosive. A. HOUGH (U.S.P. 1,822,290, 8.9.31. Appl., 16.5.30).—Vegetable parchment shredded into strips, $\frac{1}{4} \times 3$ in., and compressed into bales, is nitrated, the purified and dried nitro-product being mixed with nitroglycerin or other nitrated liquid polyalcohol and colloided with a suitable solvent. W. J. WRIGHT.

XXIII.—SANITATION; WATER PURIFICATION.

Treatment and disposal of dairy waste waters. F. H. MCDOWALL (New Zealand Dept. Sci. Ind. Res., Bull. 27, 1931, 36 pp.).—The increasing difficulty of coping with dairy waste and the regulations of various countries are discussed. Various methods of waste treatment are detailed and classified under the headings: seepage, settlement, filtration, biological treatment in contact beds, percolating filters, septic tanks in conjunction with contact beds of percolating filters, chemical, chemical with biological treatment, broad irrigation, activated sludge. The applicability of different methods to sp. conditions is considered. E. B. HUGHES.

Boiler-water foaming.—See I.

PATENTS.

Fumigant material. H. W. HOUGHTON, Assr. to SAFETY FUMIGANT Co. (U.S.P. 1,818,136, 11.8.31. Appl., 5.3.28).—A mixture of KCN, a bromide (or iodide), and an oxidising agent (KClO_3) in proportions such as to yield, on treatment with dil. HCl, progressively decreasing quantities of CNCl , CNBr (or CNI), and HCN is briquetted by the addition of a plastic binder comprising, e.g., CaO , sand, NaCl , and H_2O (cf. U.S.P. 1,521,537; B., 1925, 146). L. A. COLES.

[Portable base-exchange] water-softening apparatus. UNITED WATER SOFTENERS, LTD., R. T. PEMBERTON, and H. S. LAWRENCE (B.P. 369,766, 13.4.31).

Spraying of liquids.—See I. Treating nitrogenous waste. Purifying air.—See VII.