BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

MAY 9 and 16, 1930.*

L-GENERAL; PLANT; MACHINERY.

Furnaces for high temperature. R. OTTO (Chem. Fabr., 1930, 41-43).—The various furnaces by means of which temperatures of 2000° to 2600° may be attained in an oxidising atmosphere are described. Zirconia is one of the most important materials for the construction. Mixtures of coal gas and air under pressure and of oxygen and petroleum vapour are employed as sources of heat. S. I. LEVY.

Component heat exchanges in the evaporative condenser. A. W. SCOTT (J. Roy. Tech. Coll., Glasgow, 1930, No. 2, 268-298).-Consideration of the heat exchange in a condenser involves the heat exchange between steam and cooling surface and the metal to water interchange. At the water-air interchange the factors involve the convective heating by the water of the air and its associated vapour, together with the process of conversion of a portion of the cooling water into vapour at the air temperature. Experimental work with steam conditions ranging from a reduced pressure of 24 in. to atmospheric pressure and a velocity of that of air up to 25 ft./sec. showed marked regularity of evaporation, and for given air conditions the rate of evaporation was determined only by water temperature and was not influenced by the depth of the cooling-water film. A working theory and design curves were evolved.

C. A. KING.

History of vacuum drying. E. PASSBURG (Chem. Fabr., 1930, 93-95).-The first vacuum dryer was an experimental one erected in 1881 in a sugar refinery in Petersburg for drying sugar containing 3-4% of moisture. After the success of this apparatus the author applied the principle to substances containing a greater amount of moisture and designed a shelf-dryer for logwood extract. The first vacuum paddle-dryer was used for brewers' grains. Later important applications were for the treatment of starch and white lead. Vacuum drying is also of importance in the manufacture of cables, armatures, and coils for dynamos and transformers, as it allows the last traces of moisture to be removed with safety from the insulating material. Experiments on the safe drying of mercury fulminate are described and the more important application, to smokeless powder with vapour recovery is referred to. In the chemical industry the rotating-drum type of dryer is the one chiefly employed. Drying may be combined with calcination without breaking the vacuum, as is done with potash liquors. C. IRWIN.

Statistical description of the size properties of non-uniform particulate substances. T. HATCH and S. P. CHOATE (J. Franklin Inst., 1929, 207, 369–387). —Adopting statistical methods, particle size is defined in

terms of the shape of the size-frequency curves of substances in the form of non-uniform particles. The size properties are related closely to the statistical parameters M_g and σ_g of the log. probability curves followed by the size-frequency distribution of such materials. This definition has advantages over the use of the average diameters Δ and D, in that the statistical parameters define one and only one sizefrequency distribution curve and yield information concerning size-distribution and relative frequency of certain sizes. The average diameters Δ and D are functions of M_g and σ_g , which therefore yield all the information given by Δ and D, besides simplifying the calculation. The theoretical conclusions are justified J. W. SMITH. by experiment.

Rapid determination of relative viscosities of opaque liquids. M. M. LOESERMAN (Ind. Eng. Chem. [Anal.], 1930, 2, 25).—A modification of the bubble method is described, for use when the liquids under examination are very opaque. H. F. HARWOOD.

Construction of platinum wire chain for the Foulk chain hydrometer. W. W. KOCH and G. F. SMITH (Ind. Eng. Chem. [Anal.], 1930, 2, 41-42).— Platinum wire chains constructed from 40-gauge wire are well adapted for use in the Foulk precision chain hydrometer (J. Opt. Soc. Amer., 1923, 7, 327), and the method of preparing such a chain is described. If a thermostat be used to keep the temperature of the system constant to 0.01° it is possible with this device to detect in such a liquid as perchloric acid a difference in density corresponding to a change in acidity of only 0.001%, whereas 0.05% is the smallest change which can be detected by even the most refined analytical methods. H. F. HARWOOD.

Decarburisation [and new type of Töpler pump]. HACKSPILL and SCHWARZ.—See X.

PATENTS.

Furnace and its operation. W. DE FRES (U.S.P. 1,740,288, 17.12.29. Appl., 7.4.21).—In a regenerative, open-hearth, or similar type of furnace it is considered that the convective effect of a rapidly moving nearly theoretical mixture is, on balance, more efficient than the radiant effect of a slowly moving mixture with excess air, as hitherto used. In this furnace one combustible, preferably the air, is heated above the ignition temperature (by the regenerator), and is then mixed with the other cold combustible in proportion to give a mixture which is explosive but below the ignition temperature ; this is then admitted to the furnace through a Venturi-shaped passage in which the velocity is high enough to prevent striking-back. The result is a

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

CL. I.-GENERAL; PLANT; MACHINERY.

short, high-temperature, turbulent and neutral flame, and in consequence the hearth may be made shorter and wider. B. M. VENABLES.

Furnace [for solid fuel]. G. A. KOHOUT (U.S.P. 1,739,907, 17.12.29. Appl., 22.8.25).—Within the furnace and parallel with the front wall is a hollow arch forming with the latter a hopper for the fuel. The fuel is drawn out below the arch by a mechanical grate. Air is supplied to the hollow of the arch, emerges over the fuel in the hopper, then passes over the arch, under another arch pendant from the roof rather further within the furnace, and into the combustion space over the burning fuel. B. M. VENABLES.

Non-reversible [regenerative] furnace. L. MAMBOURG, ASST. to LIBBEY-OWENS GLASS CO. (U.S.P. 1,739,973, 17.12.29. Appl., 10.10.25).—In a glass "tank" all the ports along both sides are continuously used for admission of combustibles, the exhaust ports are situated at the feed end, and the reversing through the regenerators is effected outside the furnace proper. B. M. VENABLES.

Rotary kilns. J. S. FASTING (B.P. 324,521, 24.1.29). —In a kiln for the treatment of slurry, chains are suspended loosely in such a manner as to assist the progress of the material through the kiln; two arrangements of the chains are figured. B. M. VENABLES.

Heat exchangers. J. HOWDEN & Co., LTD., and J. H. HUME (B.P. 325,697, 25.2.29).—A heat exchanger, e.g., an air heater for boilers, of the type where the outer fluid makes a number (say 4) of passes across tubes carrying the inner fluid, is provided with diverting dampers so that the flow may be either full-series (4 passes) or series-parallel (2 passes). B. M. VENABLES.

Heat exchanger. H. THOMAS, ASST. to SUN OIL Co. (U.S.P. 1,742,833, 7.1.30. Appl., 13.1.26).—In an exchanger of the concentric tube type, a method of connecting the ends of the tubes in series is described. To allow for expansion the connectors, at one end, for the pairs of inner tubes lie entirely within those for the outer tubes. Removable blank flanges and plugs are provided to enable any tube to be cleaned without removal. B. M. VENABLES.

Heat-exchange apparatus. A.-G. DER MASCHINEN-FABR. ESCHER WYSS & Co. (B.P. 309,570, 12.2.29. Switz., 13.4.28).—A safety device, *e.g.*, to protect feedwater heaters, works on the principle that if leakage arises so that more water goes in than comes out, the apparatus will be isolated and the water by-passed round it. The control is effected by a pair of "staticpressure plates" each connected to a double-acting cylinder the pistons of which are coupled together.

B. M. VENABLES.

Utilisation of waste heat. H. B. SMITH, Assr. to BABCOCK & WILCOX Co. (U.S.P. 1,741,663, 31.12.29. Appl., 6.4.27).—Heat is transferred from hot, solid, noncombustible material to air, then from the air partly to a boiler. The partly cooled air without further contact with the hot solid is mixed with finely-divided fuel and burned for the production of additional hot solid material. *E.g.*, cement clinker from a rotary kiln may drop down a vertical passage the upper part of which is scaled against air-flow by transverse, staggered, sloping shelves over which the clinker slides; after the vertical passage the clinker may pass through a rotary cooler. Air passes countercurrent through the rotary cooler and lower part of the passage, then through a boiler, a suction-and-pressure fan, to the burner of the kiln.

B. M. VENABLES.

RETTS

Drying apparatus. B. DEWEY and T. L. TALIA-FERRO (U.S.P. 1,741,981, 31.12.29. Appl., 22.1.26).— The apparatus is for supporting plate-like objects out of contact with each other as they pass through an enamelling oven. B. M. VENABLES.

Cooling tower. J. M. SEYMOUR (U.S.P. 1,739,867, 17.12.29. Appl., 12.8.27).—The water to be cooled is permitted to drop only a short distance at a time from an uppermost feed tank on to and through several storeys of perforated sheets, to a catch pit at the bottom. Horizontal air currents are maintained between the sheets by means of fans. The cooling zone is preferably annular with peripheral inlets and inner vertical outlets for the air. Owing to the low fall, splashing is slight and any spray is caught on the outer walls because of the rotation of the air. B. M. VENABLES.

Removal of liquid with or without solid particles therein from the surface of rotary drums transporting it, particularly in cooling apparatus. APPAREILS ET EVAPORATEURS KESTNER, SOC. ANON. (B.P. 324,559, 7.3.29. Fr., 21.1.29).—The liquid is removed from the main drum by a roller making watertight contact with it, and from the roller by a plate making rubbing contact. The materials of the roller and plate are chosen so that the coefficient of friction is low, e.g., they may be rubber-covered and of glass, respectively. B. M. VENABLES.

Anti-freeze compound. V. W. HAAG, H. E. BIGLER, and I. L. HAAG (U.S.P. 1,742,349, 7.1.30. Appl., 27.11.25).—The mixture comprises water, glycerin, and glucose in substantially equal proportions. The glucose may be the commercial quality containing dextrose, and is preferably mixed with part of the water when heated to 100°, then the rest of the water is added and finally the glycerin. B. M. VENABLES.

Refrigerant. MARLO REFRIGERATING Co., LTD., and F. C. MALIN (B.P. 325,925, 27.12.28).—A refrigerant which functions at relatively low pressures and evaporates gradually comprises 80—94 pts. of methyl chloride, 6—3 pts. of sulphur dioxide, and 4—1 pts. of bromine or 10—2 pts. of carbon tetrachloride, the higher proportions of methyl chloride being used when the lower temperatures are desired. L. A. COLES.

Crushing, grinding, and refining machine. S. BRAMLEY-MOORE, ASST. to BRAMLEY MACHINERY CORP. (U.S.P. 1,740,194, 17.12.29. Appl., 18.6.29).—A corrugated surface is formed on the interior of the fixed casing by welding rods thereto, parallel to the axis. The moving grinding surface is also formed of rods which are supported on springs and forced outwards by a tapering inner shaft within the boss of the rotor, acting through push rods and sliding pieces.

B. M. VENABLES.

down a vertical passage the upper part of which is sealed Comminuting mill. R. C. NEWHOUSE, Assr. to

ALLIS-CHALMERS MANUF. Co. (U.S.P. 1,739,855, 17.12.29. Appl., 20.12.28).—The general construction of this multi-stage tube mill is similar to that described in U.S.P. 1,710,666 (B., 1929, 497), but the oversize from the surrounding screen is returned to the mill through a passage formed in a tyre. B. M. VENABLES.

Beater mill. [Disintegrator.] W. J. KUNTZ (U.S.P. 1,742,511, 7.1.30. Appl., 18.4.28).—A disintegrator is provided with a discharge chamber to which the communication from the mill is guarded by a series of hinged vanes, the adjustment of which determines the size of the product delivered. B. M. VENABLES.

Means for disintegrating solid materials. H. A. PERTWEE (B.P. 325,583, 22.11.28).—The machine is suitable for coke and materials of similar toughness and comprises a pair of rollers with very pronounced teeth. The teeth are formed on rings which are individually detachable from the rollers because they are divided into at least two segments and are held in place by longitudinal bolts. B. M. VENABLES.

Grinding or pulverisation of gummy, pasty, or viscous material. H. F. KLEINFELDT, Assr. to ABBE ENG. Co. (U.S.P. 1,739,761, 17.12.29. Appl., 1.10.26).—The material is chilled and thereby rendered brittle by mixing with solid carbon dioxide, either in a separate mixer or in the pulveriser itself.

B. M. VENABLES.

Washing of granular material. A. J. MASON (U.S.P. 1,741,063, 24.12.29. Appl., 21.1.29).—Material such as phosphate of lime which has already been washed with a large quantity of water, but still has indurated clay etc. adhering to the particles of sand, is mixed with water not exceeding 40%, preferably about 20%, of its own weight, treated to an abrasion process in some form of puddler, and then dried.

B. M. VENABLES.

Mixing machine. C. NIELSEN (U.S.P. 1,737,609, 3.12.29. Appl., 28.5.28).—Solid material is fed into a mixing tank by means of an agitator operated through a clutch by the mixing shaft, which, in turn, is operated by an electric motor. The liquid is admitted to the tank by a float valve which also operates the clutch and switch for the motor in correct sequence. B. M. VENABLES.

Digestors. SILLER & RODENKIRCHEN GES.M.B.H., and W. SILLER (B.P. 325,760, 17.5.29).—The digestor is rotated on trunnions to effect stirring. Through twin passages in one trunnion a heating fluid is passed to and from a jacket, and within the other hollow trunnion is a stuffing-box surrounding a fixed shaft which spreads out within the digestor and forms a stirrer. This shaft is also provided with two internal passages and the stirrer with ports to admit acid or other liquid through its lower part and to discharge pulp through the upper part. The apparatus is suitable for the extraction of glucose from wood by means of acid.

B. M. VENABLES. Evaporators. O. ENGISCH (B.P. 308,622, 23.3.29. Ger., 24.3.28).—A heating element for sea-water evaporators is constructed in the form of a deeply corrugated cylinder which is rotated against scrapers (or against which scrapers are rotated); the latter are flexibly supported to allow for expansion of the heater. B. M. VENABLES.

Evaporation of liquids [sulphite lye] and apparatus therefor. S. H. LEDIN and J. O. NAUCLÉR (B.P. 300,590, 15.11.28. Ger., 15.11.27).—Flue gases are forced through a perforated plate above which about 1—2 cm. of liquid are maintained, intense bubbling being thereby produced with consequent large contact surface. Various forms of foam traps are described. [Stat. ref.] B. M. VENABLES.

Apparatus for bringing liquids and gases into intimate contact. T. PIGGOTT & Co., LTD., J. W. MARTIN, and F. E. BANFORD (B.P. 325,724, 21.3.29).— The apparatus comprises one fixed drum and several rotating concentric drums. The annular spaces are filled with brush-like material. The gas flows in a longitudinal zig-zag manner through the upper parts of the drums, the general direction being from the circumference inwards, while liquid is supplied to the innermost compartment, forms a bath in each compartment in the lower part of the apparatus, and flows countercurrent to the gas. B. M. VENABLES.

Treatment of gases with solids and liquids. C. COOPER, D. M. HENSHAW, and W. C. HOLMES & CO., LTD. (B.P. 324,747, 21.11.28).—This invention permits the renewal of a tower filling without stopping the flow of gases. The tower is divided into stories by means of flap valves upon which the filling (inert or reactive) rests, and the gases travel in a zig-zag course across the tower, passing from storey to storey through external passages. The lowest section of the filling is removed from the bottom, the remaining sections are dropped one stage, and a fresh charge is added at the top by operating the flap valves in succession upwards.

B. M. VENABLES.

Separating apparatus, particularly for the separation of liquids from gases. G. E. T. Evsrow (B.P. 324,656, 30.10.28).—The gases pass through a fixed duct in the walls of which are apertures through which the liquid is deflected by moving baffles; *e.g.*, the apertures may be annular and the baffles in the form of fans which are rotated by the gas current and of which the tips extend into an outer chamber where the atmosphere is substantially quiet, though a slight current of gas to carry off the separated matter may be permitted through it. B. M. VENABLES.

Treatment of gas or a mixture of gas and vapour in the presence of catalytic agents and reactivation of such agents. COMP. INTERNAT. POUR LA FABR. DES ESSENCES ET PÉTROLES (B.P. 324,481, 18.12.28. Fr., 24.10.28).—The catalyst is contained in an annular chamber between two cylindrical shells and the gases to be treated pass through in a longitudinal direction, but the gases for regeneration are delivered into the mass at a number of different places.

B. M. VENABLES.

Porous moulded body for use in diffusion, filtration, etc. and its manufacture. J. MÜLLER, Assr. to SCHUMACHER'SCHE FABR. G.M.B.H. (U.S.P. 1,742,411, 7.1.30. Appl., 8.7.26. Austr., 10.7.25).— A mixture of hot, comminuted, refractory material,

such as sand, glass, or asbestos, with a bituminous binder (e.g., asphalt, hard pitch) is moulded under pressure at a temperature approaching the m.p. of the binder. After cooling, the moulded article is reheated at 300—400°, and then slowly cooled. S. K. TWEEDY.

Treatment of boiler water. C. T. McGILL (U.S.P. 1,742,714, 7.1.30. Appl., 29.8.27).—Part of the raw water is passed through a softener of the base-exchange or lime-soda type and part is left unsoftened, the fractions are metered and mixed in a heater, and the mixture is fed to all the boilers. Each boiler is in circuit with a "deconcentrator" where mud is settled out. The water from each boiler is tested at intervals, and according to its condition either additional softening reagent or a coagulant is added to the individual boiler.

B. M. VENABLES.

Manufacture of a packing composition for stuffing-boxes etc. F. SCHAUB (B.P. 325,566, 14.11.28). —A lubricant such as oil or fat, binders, and graphite are mixed and kneaded with sufficient granular solid particles of graphite or carbon to form a support, so that the mixture is plastic, elastic, adherent, and sufficiently stiff to remain in the gland when used alone.

B. M. VENABLES.

[Radiation] pyrometer. F. C. WHALEN, and RADIOVISOR PARENT, LTD. (B.P. 324,500, 4.1.29)— The energy in any part of the spectrum from a "black" body being a function of the total energy radiated, the light radiated from the furnace or other article is measured. The light is reflected on to a selenium bridge or other sensitive device and a filter for the longer waves is interposed to prevent an undue rise of temperature. B. M. VENABLES.

Colorimeters. A. HILGER, LTD., F. TWYMAN, and J. PERRY (B.P. 324,351, 18.8.28).—The light from a sample is analysed by three screens and the primary colours are allowed to fall separately on to a measuring and recording device such as a photographic film or thermo-electric cell with galvanometer, which gives a definite figure to the intensity of primary colour. Alternatively, a standard colour may be compared with the sample by means of a flicker device, thermo-electric cell, and telephone, the intensity of any primary colour being adjusted by calibrated neutral wedges until sample and standard give the same effect. Calculations are given for the preparation of the filters.

B. M. VENABLES.

Colorimeter. R. A. HOUSTOUN (B.P. 324,495, 1.1.29).—A mirror-lined tunnel is closed at the observer's end by a sheet of ground glass and at the other end by two filters sliding over each other, outside which is a source of light such as an opal gas-filled electric lamp. The filters are coloured magenta and yellow, peacockblue and magenta, respectively in halves, the combination forming red, green, and blue rectangles of which the width and therefore the amount of each primary colour can be varied by sliding the filters to different measured positions. The tunnel combines the colours, and the uniform tint on the ground glass is observed simultaneously with the object by means of a partly silvered mirror. B. M. VENABLES.

Calcining furnace and method of operating the

same. E. Klöhn, Assr. to Zahn & Co., G.M.B.H. (U.S.P. 1,751,161, 18.3.30. Appl., 3.8.27. Ger., 30.12.26).— See B.P. 290,837 ; B., 1928, 551.

Mixing apparatus. A. B. and C. R. SMITH (U.S.P. 1,751,221, 18.3.30. Appl., 24.9.27. U.K., 5.10.26).— See B.P. 278,177; B., 1927, 896.

Grinding mill. R. M. HARDGROVE, ASST. to FULLER-LEHIGH CO. (U.S.P. 1,751,918, 25.3.30. Appl., 14.5.28). —See B.P. 311,688 ; B., 1929, 1000.

Grinding mill. T. BRAGARD, Assr. to MACAOWAL-ZENNÜHLEN-GES.M.B.H. (U.S.P. 1,750,088, 11.3.30. Appl., 3.7.28. Ger., 9.6.27).—See B.P. 291,803; B., 1928, 878.

[Centrifugal] separator drum. A. SCHMÜCKING, Assr. to F. KRUPP A.-G. (U.S.P. 1,750,364, 11.3.30. Appl., 19.10.28. Ger., 28.10.27).—See B.P. 299,454; B., 1929, 459.

Separately recovering soluble substances in a coarse granular condition. F. JEREMIASSEN, ASSR. to A./S. KRYSTAL (U.S.P. 1,751,740, 25.3.30. Appl., 24.12.25. Norw., 12.1.25).—See F.P. 612,993 ; B., 1927, 463.

Filter. R. KNIESEL, ASST. to BAMAG-MEGUIN A.-G. (U.S.P. 1,751,819, 25.3.30. Appl., 22.6.28. Ger., 20.2.28).—See B.P. 304,967; B., 1929, 308.

[Filter] fabric and treatment of subdivided materials. S. C. SMITH (U.S.P. 1,752,210, 25.3.30. Appl., 31.3.28. U.K., 5.4.27).—See B.P. 298,172; B., 1929, 3.

[Discharge of liquids from] centrifugal separators. E. A. FORSBERG, ASST. to DE LAVAL SEPARATOR CO. (U.S.P. 1,749,764, 11.3.30. Appl., 6.2.28. Swed., 12.2.27).—See B.P. 285,088; B., 1928, 658.

Device for removing solid particles from flue gases. M. Prétor and F. ULLMANN (U.S.P. 1,749,260, 4.3.30. Appl., 5.12.27. Fr., 4.12.26).—See B.P. 281,651; B., 1929, 269.

(A) Refrigerators, (B) method of refrigeration, using solid carbon dioxide as refrigerant. J. J. V. Armstrong. From Dry Ice Equipment Corp. (B.P. 326,196-7, 1.10.28).

Tanks for transport of volatile liquids. G. V. TONTET (B.P. 325,766, 11.6.29).

Recovering fine material from settling tanks etc. (B.P. 325,320).—See II. Crystallisation (B.P. 325,650 and 325,757).—See VII. Porous objects (U.S.P. 1,742,515).—See VIII. Briquetting of flue dust (U.S.P. 1,741,544).—See X.

II.—FUEL; GAS; TAR; MINERAL OILS.

Choice of liquid fuels. E. W. STEINITZ (Papier-Fabr., 1930, 28, 154—158).—The calorific value and the sp. gr. are unsuitable as criteria for the evaluation of liquid fuels. The volatility as shown by the distillation curve is of greater value for this purpose. Various types of motor spirits and Diesel oils, their distillation curves, anti-knocking properties, and comparative prices, are briefly discussed. A. B. MANNING.

Blast lamp for natural gas.. H. H. STRAIN (Ind. Eng. Chem. [Anal.], 1930, 2, 128).—The burner consists of a cylindrical tube mounted on a metal base which is pivoted on a metal stand. The burner tube is provided with a sliding top and a rotating air shutter. The gas enters the burner through a jet in the burner-tube base and the compressed air enters through a longer curved tube ending in a jet on a level with the sliding top. Both jets screw into place, and are replaceable by others of various sizes. H. S. GARLICK.

Determination of sulphur in illuminating gas. H. A. J. PIETERS (Z. anal. Chem., 1930, 80, 12-20).-The colorimetric determination of the total sulphur in gas as colloidal lead sulphide gives satisfactory results in the case of an unpurified gas or one rich in sulphur, but the combustion method is preferable for gas containing relatively little of this constituent; in the latter case the determination of the sulphuric acid formed must take place gravimetrically as barium sulphate and not by titration, as the volumetric process yields results which are much too high when but little sulphur is present. The sulphur present as hydrogen sulphide is best determined by passing the gas through a solution of cadmium acetate in dilute acetic acid, then adding standard iodine solution, and thoroughly shaking; excess iodine is back-titrated with 0.05N-thiosulphate. H. F. HARWOOD.

Utilisation of industrial vegetable residues. I. Dry distillation. P. LEONE and F. OCCHIPINTI (Annali Chim. Appl., 1929, 19, 563-568).-Lemon pastazzo, representing the whole of the lemon after removal of the juice and essential oil, contains about 80% of moisture, the percentage composition of the dry matter being : fats, waxes, and resins 24-35; cellulose 19-22; pectic substances 14-16; mucilage, gum, and hemicellulose 10-14; lignin 8-9; dextrose 1-2.5; and ash 4-4.2. When distilled at 400-425°, 100 g. of the air-dried material (11.7% of water) yield 15 litres of gas of calorific value 2680, 40.5 g. of distillate, 9.5 g. of tar, and 25 g. of carbon. The distillate contains (%): acetic acid 4.51, methyl alcohol 1.33, ketones 0.64, acetone 0.48, reducing substances 3.89, and tar 4.02; the percentage composition of the gas is: CO2 51.9, CO 18.0, heavy hydrocarbons 0.6, CH4 23.1; $H_2^{2.0}$, and $N_2^{4.5}$; the granular carbon contains: C 72.23, H 3.76, N 0.36, and S 0.27%, and has calorific value 4600 ; the tar has $d^{15} 0.9925$. Exhausted sansa contains (on dry matter) : fats soluble in carbon disulphide 0.45; fats, resins, and waxes soluble in alcohol or benzene $12 \cdot 2$; cellulose $44 \cdot 0$; lignin $36 \cdot 9$; ash $4 \cdot 1$. On distillation, 100 g. of the dry sansa yield 14.3 litres of gas, 30.8 g. of distillate, 6.3 g. of tar, and 35 g. of carbon. The distillate contains (%) : acetic acid 12.03, methyl alcohol 4.58, acetone 0.74, reducing substances 3.94, and tar 2.0. The gas consists of CO₂ 51.9, CO 22.5, H₂ 3.3, CH₄ 21.9, and N₂ 0.4%, the calorific value being 2420. The charcoal is granular, contains 11.05% of ash, and has apparent d 0.35 and calorific value 5400. T. H. POPE. Modernisation of a wood-distillation plant. J.

Modernisation of a wood-distillation plant. J. SCHWYZER (Chem.-Ztg., 1930, 54, 65-66, 86-87, 106-108, 122-124).—A modernised plant for the carbonisation of deciduous woods is described. The ten retorts, each of 175 cub. m. capacity, are of thick wrought

iron and supported by a lattice of angle irons. Each is in an independent setting fired by producer gas, and the exit gases are used for drying acetate of lime. The retorts are charged from above by a wagon on a runway, an operation requiring $1\frac{1}{2}$ days. For the first $2\frac{1}{2}$ days the heat is applied to the upper part of the retort, then by changing dampers to the lower part. Cooling is effected by opening airports. Pairs of retorts are connected to cylindrical condensers from which the uncondensed gases pass at the beginning of the distillation to the air, and afterwards to the washing plant. The condensate from the first cooler is stored separately. The gases pass by a copper pipe to a packed scrubber tower designed, for reasons of safety, to impart a minimum back-pressure. Here they are washed with an alkaline liquor and pass to the producer-gas flues. Such large retorts give a better charcoal than small ones, and an increase of 10-15% in the yields of acetic acid and methyl alcohol; they are also more economical in fuel and labour. The distillate settling tanks are large enough to take 15 days' output. The crude wood spirit is distilled in a 6000-litre copper still, and the distillate passes through two acetic acid absorption vessels, which are charged with liquor from the scrubber to which lime has been added. The residue from the still is run down to the crude acetic acid still. This is of 3600 litres capacity, and is also connected to two receivers containing a solution of 8% CaO content. As foaming does not occur after the methyl alcohol and acetone have been driven off, this still is worked much more quickly. The residual tar passes to a vacuum still. The separation of the distillation into stages as above tends to economy in first cost and repairs. The distillate from the tar, consisting of acetic acid and its homologues, is purified by passing over sodium dichromate and sulphuric acid and fractionating in a high Raschig column. The calcium acetate solution is filterpressed and evaporated in vacuo. The vapours from the crude spirit still are condensed, stirred with milk of lime, and allowed to settle. It must be definitely alkaline or the methyl alcohol produced will be discoloured. The product contains about 15% of methyl alcohol, 2% of methyl acetate, and 2% of acetone, together with allyl alcohol, tar oil, and resins. It is rectified in a still consisting of two boilers connected to one column. These two boilers will work either into the column or into each other, and by the system described will give a resin-free distillate in one operation. This is divided into two fractions, which are further redistilled with separation of forerunnings containing acetone and permanganate treatments. The alcohols are recovered practically quantitatively. The calcium acetate is placed in a still connected to a cooler collecting vessel and column, and sulphuric acid is slowly run in. The acetic acid is then distilled off by indirect steam under vacuum. The tar is distilled to give the following fractions: crude acetic acid, light oil, and creosote. The light oil is then washed, and further fractionated to "light benzine" and "turpentine substitute."

C. IRWIN.

Crude oil from bore hole No. 20 in Chusovaya (Perm). S. S. NAMETKIN (Neft. Choz., 1929, 17, 79-82).—Characteristics of the oil and its distillates

are recorded. The bore-hole water is noteworthy for its high content of ammonium ions and for the absence of carbonate and hydrogen carbonate ions.

CHEMICAL ABSTRACTS.

Viscosities of crude-oil products. I. D. AFANASIEV (Neft. Choz., 1929, 17, 218—229).—Calculated and observed viscosities of various gasolines, kerosenes, and lubricating oils were in agreement when Ubbelohde's equation was used. Intermediate points on the viscosity-temperature curve were calculated. Changes of viscosity on treatment of turbine oil with fuming sulphuric acid and of spindle oil with concentrated sulphuric acid were determined. CHEMICAL ABSTRACTS.

Thermal conductivity of petroleum products. V. ZHUZE (Azerbeid. Neft. Choz., 1929, No. 8—9, 70—80).—Thermal conductivities of distillates from Baku crude oils, determined by Schleiermacher's and Winkelmann's methods, are recorded.

CHEMICAL ABSTRACTS.

Determination of aromatics in gasoline by the nitrobenzene method. A. DOBRYANSKI and I. KHESIN (Azerbeid. Neft. Choz., 1929, No. 8—9, 80—84).—The nitrobenzene coefficient diminishes rapidly with increase in concentration of aromatic compounds, but is independent of the nature of the gasoline. The following coefficients (coefficient, and aromatic compounds [vol. - %] for 1—13° depression, respectively) are recommended for oils pretreated with sulphuric acid as usual: 1.37, 0.8; 1.34, 1.5; 1.30, 2.3; 1.27, 3.0; 1.24, 3.9; 1.21, 4.8; 1.18, 5.8; 1.15, 6.8; 1.12, 7.9; 1.09, 9.1; 1.06, 10.6; 1.03, 12.1; 1.00, 14.0. CHEMICAL ABSTRACTS.

Composition of cracked gasoline from Baku and Grozni. I. E. BESPOLOV (Azerbeid. Neft. Choz., 1929, No. 6-7, 79-91).—The product (of Vickers plant cracking mazout from Surakhani) has a low initial b.p. and good anti-detonating properties.

CHEMICAL ABSTRACTS.

Gasification of heavy oils. M. CHILOWSKY (Compt. rend., 1930, 190, 490-492).-The necessary and sufficient conditions for the gasification of heavy oils with production of no fixed carbon and not more than 1% of tar are that (i) the oil be blown in by air in an atomised state; (ii) the air used for this purpose be heated above the inflammation temperature of the oil (best at 500-700°); and (iii) the flow of oil and gases be so arranged that the walls of the combustion chamber are maintained at about 1000°. In this way a heavy oil distilling at 230-370° and ground-nut oil yielded gases of the following compositions, respectively: CO 13.8, 17.95; $CH_4 9.1, 7.3; C_2H_4 4.4, 5.6; H 8.6, 4.8; N 59.3,$ 57.8; CO24.8, 5.9%. The theory of the process is discussed and its application to internal-combustion engines, in which its use would allow of a compression ratio of 8, is advocated, a reduction of 75% in expense being claimed. In their the offer C. A. SILBERRAD.

Modification of lamp method for determination of total sulphur in petroleum distillates. A. E. Wood and W. MATTOX (Ind. Eng. Chem. [Anal.], 1930, 2, 24-25).—Natural-gas gasoline or other light distillate is placed in a test-tube graduated in tenths of a c.c., and a wick, consisting of two strands of cotton

fibre extending almost to the bottom of the test-tube, are inserted in a glass tube (12 cm. \times 4 mm.) held in a cork of appropriate size. The graduated test-tube is placed in an ice-water bath provided with a levelling attachment. By regulating the height of the cooling liquid with reference to the gasoline in the test-tube a steady flame can be maintained indefinitely. After adjustments, the volume of gasoline in the test-tube is read and the flame immediately placed under the absorption apparatus of the standard lamp method for sulphur determination. Burning is continued for about 90 min. or until about 2 c.c. of the gasoline have been consumed, when the flame is extinguished and the volume of the gasoline again read. For ordinary gasoline or kerosene the ice-water bath is dispensed with, and for heavy distillates free from tarry or asphaltic matter a heated liquid bath is used. The method is not suitable for crude oil. H. S. GARLICK.

Determination of sulphur in gasoline. G. EDGAR and G. CALINGAERT (Ind. Eng. Chem. [Anal.], 1930, 2, 104—106).—Several modifications of the standard A.S.T.M. apparatus are described, viz., means for adjusting the flame of the standard lamp, lamps permitting adjustment of the flame during the determination and allowing the amount of fuel burned to be determined by volume, a new type of absorption tube, and a modified chimney permitting the elimination of the blank determination, all of which facilitate routine handling of large numbers of samples. The results obtained are essentially the same as those obtained by the standard method. H. S. GARLIOK.

Determination of vapour pressures of naphthas. J. C. STAUFFER, J. K. ROBERTS, and W. G. WHITMAN (Ind. Eng. Chem. [Anal.], 1930, 2, 88-91).-Measured volumes of dry air are bubbled through the naphtha sample and the increase in volume is measured. Saturation of the air with hydrocarbon vapour is obtained by reference to the vapour pressure of pure organic liquids of known vapour pressures. The vapour pressure 18 calculated from measurements of the total gaseous volumes, the decrease in liquid volume, and the pressure existing in the system. The determined vapour pressures are plotted against the percentage evaporation and the initial vapour pressure is estimated by extrapolation of the curve to 0% loss. The vapour pressures determined by this method check with those computed by means of Raoult's law from the fractional analyses of the naphthas, and afford a convenient means for investigating evaporation losses during storage or transportation and the performance of stabilising and condensing equipment. H. S. GARLICK.

Behaviour of hydrocarbons in high-tension discharge. H. BECKER (Wiss. Veröff. Siemens-Konz., 1929, 8, [2], 199—217).—On passing a high-tension discharge through a saturated paraffin oil in the Siemens ozonising tube, hydrogen is evolved and a higher paraffin formed thus: $C_nH_{2n+2} + C_mH_{2m+2} = H_2 + C_{(n+m)}H_{2(n+m)+2}$. Under the same conditions unsaturated hydrocarbons yield mixtures of saturated hydrocarbons of high mol. wt., the hydrogen evolved in the first reaction being absorbed again at the double linking. Cyclic hydrocarbons behave in a complex manner, mixtures of satur-

ated and unsaturated compounds being formed from degradation products of the original hydrocarbons. Thus, decahydronaphthalene (decalin) yields butane and small quantities of various unsaturated hydrocarbons together with up to 25% of resinous condensation products of high mol. wt. and b.p. above 200° (<1 mm.). Tetralin, when treated in air, yields hydrogen cyanide and other compounds containing nitrogen, but in hydrogen a yield of 23% of a colourless almost solid resin is obtained if the tetralin is treated in the vapour form. If the operation is conducted in a Geissler tube the resin produced yields, after extraction with acetone, colourless crystals of ditetralyl, C20H22, formed by the condensation of two mols. of tetralin with the elimination of 1 mol. of hydrogen. From the remaining resin two fractions were obtained by distillation in vacuo, viz., a yellow oil $(n_{\rm p}^{13} \cdot 5948)$ and colourless crystals. Methane yields small quantities of liquid hydrocarbons when subjected to the silent electric discharge in the Siemens ozonising tube.

A. R. POWELL. Cracking of mineral oils in presence of the electric arc. G. FESTER and C. CHRISTEN (Z. Elektrochem., 1930, 36, 17–20).—Mineral oil, through which a current of hydrogen gas was passed, and above the surface of which an electric arc was made to operate between electrodes formed of rods of either nickel or iron, was subjected to distillation. Numerous data are given of the compositions of the cracked gases, and of the distillation ranges of the cracked distillates. H. T. S. BRITTON.

Action of high-tension alternating currents on natural brine-petroleum emulsions. S. STARZEWSKI (Przemysl Chem., 1930, 14, 97-105).—The frequency with which sparking takes place between two electrodes immersed in brine-petroleum emulsions increases with increasing voltage, with decreasing distance between the electrodes, and with the temperature of the emulsion. Coagulation of the dispersed phase is more rapid and complete in the absence of sparking. The optimal temperature of demulsification has to be experimentally determined for each emulsion ; for two Galician natural water-in-oil emulsions studied, this temperature was about 55°. It is concluded that the electrical method is not, in its present form, practically applicable to the separation of such emulsions. R. TRUSZKOWSKI.

PATENTS.

Cleaning of carbonaceous materials. CLEAN COAL CO., LTD., R. LESSING, R. H. ALLEN, and E. S. GYNGELL (B.P. 325,031, 27.11.28. Cf. B.P. 276,723 and 282,874; B., 1927, 866; 1928, 179).—The materials are subjected to gravity separation in an aqueous solution of suitable density, the bath liquor being given an upward current of controlled magnitude greater than about 6 in./min. Automatic means are provided for maintaining a constant liquid level-in the bath.

A. B. MANNING.

Apparatus for separating coal from dirt and like foreign substances. W. H. BERRISFORD (B.P. 325,284, 17.11.28).—The separation is based on the different rates of travel of the coal and the dirt along a plate of hard material, preferably glass, on to which the impure coal is allowed to fall, the coal receiver being separated from the edge of the plate by a gap into which the dirt falls. The plate is curved and is so arranged that the direction of travel of the coal and dirt is substantially horizontal when they reach the lower edge. A. B. MANNING.

Apparatus for recovering fine material, and more particularly fine coal, from settling tanks or towers. Coppée Co. (GREAT BRITAIN), LTD., and T. H. HUNTER (B.P. 325,320, 6.12.28) .- A poweroperated valve, which is either controlled by an operator from the point where the material is discharged or is automatically opened at predetermined intervals of time, is provided at the bottom of the settling tank. The particles of material that collect in the tank are thereby discharged as required, and are forced by the head of material in the tank to a higher level. The material is discharged into a second tank, which is fitted with an overflow whereby any excess material delivered thereto is returned into circulation. Revolving nozzles are provided in the sides of the tank in order to deal with any undesirable accumulation of solid material therein. A. B. MANNING.

Preparation of pulverised solid fuels. G. S. Lov (B.P. 301,887, 27.7.28. Fr., 9.12.27).—The raw fuel is subjected to drying, pulverising, and sorting operations in a closed circuit, from which the required supply of finely-pulverised material is automatically withdrawn by the suction of the blowers which feed the fuel to the burners. The whole supply of dust in excess of the actual consumption is recirculated, and fresh raw fuel is automatically added to the circuit in amount equivalent to the pulverised fuel consumed. A form of apparatus for carrying out the process is described.

A. B. MANNING.

Pretreatment of moist fuels, particularly lignites, prior to carbonisation or gasification. H. FLEISS-NER (Austr.P. 109,406, 7.8.25).—The fuel is treated with steam in a closed vessel under conditions that do not permit the escape of the moisture contained in it, and is then dried by passing through it the hot gases from the carbonisation or gasification process itself.

A. B. MANNING.

Treatment of peat for production of fuel therefrom. D. W. BERLIN and J. A. BRINCK (B.P. 325,444, 22.5.29).—The raw peat is disintegrated and formed into a liquid sludge with water, and is then subjected to wet carbonisation. The bulk of the residual water is removed from the product by centrifuging, followed, if necessary, by compression in a filter press. The material is further dried by heat treatment and may finally be briquetted. A. B. MANNING.

Treatment of peat. G. E. A. CUVLITS (F.P. 634,826, 21.5.27).—Crude peat is treated with one or more diastases in order to separate part of the water in the hydrocellulose in the material. The product, separated from the liquid by centrifuging or similar means, appears in powdered, granular, or other form. A. B. MANNING.

Vertical continuous distillation retorts. J. PIETERS (B.P. 325,735, 5.4.29).—A rigid casing, slightly smaller in cross-section than the upper end of the distillation chamber, is provided between the latter and

the feed hopper. A piston, open in the centre and forming a frame the sides of which have a vertical crosssection of double-wedge form, can be moved vertically within the casing by means of bars which are attached to its two ends and can be operated from above the retort by a discharging device. Clogging of the material in the upper end of the distillation chamber is thereby prevented. A. B. MANNING.

Apparatus for heat treatment of solid or semisolid carbonaceous material. W. E. TRENT (B.P. 325,324, 8.12.28).—The retorts and combustion chambers of the apparatus are arranged side by side, and the heat is transmitted from the latter to the former by means of metal rods extending horizontally through both. The material to be carbonised is introduced into the retorts on trays which are supported therein by the conducting rods. Means are provided for passing steam through the retorts and for withdrawing and condensing the vapours evolved. A. B. MANNING.

[Regenerative] coke ovens. E. LEYH, Assee. of H. KOPPERS A.-G. (B.P. 301,386, 14.11.28. Ger., 28.11.27).—The heating walls are connected in pairs by conduits passing above the oven chambers, and are so arranged that during any one draught alternation the gases pass unidirectionally (up or down) through each wall. A regenerator below each chamber is divided into two sections by a partition wall transverse to the length of the chamber. The sections are connected, respectively, to two adjacent heating walls, each section being connected directly to the portion of the heating wall immediately above it, and by means of an extension passage to the portion of the wall lying above the companion regenerator section. A. B. MANNING.

Regenerative coke ovens. F. TOTZEK, Assee. of H. KOPPERS A.-G. (B.P. 302,225 and Addn. B.P. 303,107. [A] 14.11.28, [B] 15.11.28. Ger., [A] 12.12.27, [B] 28.12.27).—(A) A coke oven has a regenerative heating system comprising cavity-heating walls alternating with the oven chambers, two regenerators or groups of regenerators extending beneath the oven transversely to the heating walls, and two base channels extending lengthwise beneath each oven chamber, each connected, respectively, with one of the regenerators and with the heating walls. The two base channels are situated one above the other, and are arranged to cross scissorwise midway in their lengths. (B) The heating walls, instead of consisting of a series of twin flues, may be coupled in pairs in such a manner that during any one cycle of draught alternation the gases pass unidirectionally through each wall. The base channels are so arranged that single channels each connected with two walls alternate with pairs of channels each connected with one wall only. A. B. MANNING.

Apparatus for cooling coke. HUMPHREYS & GLAS-GOW, LTD., and J. S. HAUG (B.P. 310,283, 22.4.29. U.S., 21.4.28).—An inclined coke container is provided with a sloping wharf which supports the hot coke. The wharf is composed of overlapping plates between which are gas passages. Above the container and connected therewith is a horizontal water-tube boiler so arranged that air or products of combustion may be circulated by means of a fan through the hot coke and through the boiler tubes in succession. A. B. MANNING.

Dry-cooling of coke. J. RUDE (B.P. 325,120, 21.2.29).—The coke is cooled by the circulation through it of steam under pressure. Subsidiary charging and discharging chambers are provided so that the coke-cooling chamber itself never comes into direct communication with the atmosphere. The increased pressure of the circuit is maintained by the addition of water or fresh steam thereto, and the surplus steam is removed in a highly superheated state and utilised, *e.g.*, for the production of water-gas. A. B. MANNING.

Burning of pulverised fuel. T. A. McGEE (B.P. 314,979, 7.5.29. Can., 6.7.28).—The pulverised combustible mixture is injected into the furnace, wherein the volatile matter and part of the carbon are burnt while the particles are in suspension; the residual carbon falls on to the furnace grate and is burnt by means of air flowing through the grate. The latter is formed of grate castings which are supplied with air-inlet and ash-outlet passages, and are supported on tubes which are water-cooled to prevent clinker formation. Provision is made for the discharge of pieces of clinker which are too large to pass through the ash-outlet passages, and for the furnace of the residual carbon deposited from the flue gases.

A. B. MANNING.

Low-temperature carbonisation of granular or dusty fuels. C. ARNEMANN (G.P. 460,420, 6.5.22. Addn. to G.P. 458,879; B., 1930, 311).—The combustion gases from a powdered fuel-fired furnace are mixed with the cold, detarred distillation gases in such proportion that the temperature of the mixed gases is just high enough to carbonise the fuel and produce a gas which is still combustible. A. B. MANNING.

Low-temperature carbonisation process. CHEM. TECHN. GES.M.B.H. (G.P. 459,824, 25.12.23).—The material is carbonised in vertical or horizontal cells which are combined in a rotatable ring in such a manner that each cell can be suitably heated. The material is fed into the cells at one position in the ring and discharged at another. Apparatus for carrying out the process is described. A. B. MANNING.

Manufacture of activated carbon. E. BERL (B.P. 324,729, 7.11.28. Addn. to B.P. 283,968; B., 1929, 465).—Carbonaceous substances which can be activated, such as wood, peat, charcoal, brown coal coke, etc., are added to the acid tars which have been neutralised with potassium compounds, and the mixture, moulded if desired, is heated to activating temperatures, preferably in the presence of oxidising gases or vapours. The organic substances in the tars may first be separated from the excess sulphuric acid by the addition of water before they are submitted to the above process.

A. B. MANNING.

Production of highly active carbon. CHEM. WERKE CARBON GES.M.B.H. (G.P. 460,697, 10.5.27).—Organic chlorides, e.g., carbon tetrachloride, trichloroethylene, chlorinated naphthalene, in the gaseous, vapour, or finely-divided liquid or solid state, are allowed to react with powdered metals, e.g., zinc, aluminium, iron, magnesium, in a heated reaction chamber, and the product is washed with water or acidified water. Substances which modify the rate of reaction, *e.g.*, kieselguhr, may be incorporated with the metals. Carbonaceous substances or charcoal may also be introduced into the chamber. A. B. MANNING.

Manufacture of carbon black. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 324,959 and 325,207, [A, B] 3.8. and 19.12.29).—(A) Gaseous unsaturated hydrocarbons are treated with a dehydrogenating cat lyst consisting of a metal of the iron group, or a compound thereof, at a moderate temperature, usually between 300° and 450°, and under elevated pressure. In (A) the treatment may be carried in the presence of other gases *e.g.*, hydrogen, water vapour, oxides of carbon, methane. In (B) the catalyst is activated by the addition of other metallic oxides or compounds, such as the oxides or hydroxides of zinc, copper, chromium, vanadium, uranium, the alkali or alkaline-earth metals, etc. The carbon blacks produced are particularly suitable for vulcanising or pigmenting purposes.

A. B. MANNING.

Determination of volatile matter in combustible material. G. H. HALVORSON (U.S.P. 1,743,035, 7.1.30. Appl., 15.1.26).—The crucible containing the sample of material is enclosed in a casing of refractory material, *e.g.*, magnesite, provided with a closely fitting cover, and is placed directly in a muffle at 950°. A uniform rate of heating is thereby attained and comparable results for the volatile matter content, given by the loss of weight of the sample, are obtained. A. B. MANNING.

Gas producer. A. Bŕchevor (F.P. 632,574, 2.8.26). —The producer comprises a chamber of refractory material divided into an upper and a lower part, with a metal retort which serves as a fuel container in the former. Between the outer cover of the generator and the divided chamber is a free space wherein the air for combustion is preheated. A. B. MANNING.

Apparatus for the continuous production of illuminating gas. É. FANCONNIER and A. SIMPÈRE (F.P. 637,179, 4.11.26).—The air carburettor consists of several inclined and parallel tubes arranged in a vertical shaft and surrounded by water. They are open at both ends, the lower ends opening into a vertical tube. The air charged with the atomised carburetting liquid in the apparatus is cooled in the tubes. A. B. MANNING.

Water-gas generating apparatus. TULLY, SONS & Co., LTD., and C. B. TULLY (B.P. 325,437, 15.5.29).— The apparatus comprises two or more retorts arranged above a gas generator in such a manner that the blow gases can pass up through flues or checker-work between, or surrounding the retorts, while the water-gas is passed through the fuel in the retorts and thence to suitable gas-purifying apparatus. Uniform heating of the fuel is ensured by providing each retort with a separate valve-controlled outlet, the valves being automatically opened periodically and in sequence so that the water-gas passes through the retorts in turn. A. B. MANNING.

Manufacture of water-gas. Power-Gas Corp., LTD., and N. E. RAMBUSH (B.P. 324,867, 23.4.29).- Steam is superheated alternately or simultaneously inside and outside the tubes of a water-gas generator tubular superheater (cf. B.P. 288,463; B., 1928, 437). The superheater tubes are heated by the blow gases and the steam is then superheated by being passed through the tubes during the up-run and round them during the down-run. The steam superheated may be partly that employed in the water-gas process and partly steam for some other purpose. A. B. MANNING.

Production of mixed gas from coal gas and other gases. STETTINER CHAMOTTE-FABR. A.-G. VORM. DIDIER (G.P. 459,653, 28.9.20).—A generator with a carbonising zone for bituminous coal is also provided with chambers wher in inferior fuels (wood, brown coal, peat) may be carbonised and gasified; the gases from the latter are then mixed with the carbonisation gases from the bituminous coal. The gasification chamber for the inferior fuel may be directly connected with the retorts which are charged with that fuel. Apparatus for carrying out the process is described. A. B. MANNING.

Production of gas from wood, waste materials, etc. J. LERAT (F.P. 637,140, 29.10.26).—The material is charged into a container and the lower part of the charge is burnt with air which is supplied through a tube from above. A. B. MANNING.

Dismountable apparatus for the carbonisation and distillation of wood. J. BONELLO and P. AUBÉ (F.P. 632,377, 23.7.26).—The charge is heated in a closed container by means of hot gases from an external source which pass up through the centre. The air required for the carbonisation of the wood is drawn through a series of perforations around the lower part of the container. The combustion chamber is closed with a cover having a damper to prevent too rapid removal of the products of combustion, which are eventually collected in an air-cooled condenser consisting of a series of vertical pipes. A. R. POWELL.

Production of mechanical work in connexion with the liquefaction of coal. E. GIGER (Swiss P. 123,928 and 124,135, [A] 11.1.27, [B] 6.1.27).-(A) The waste gases from the hydrogenation process, together with the vapours and suspended substances contained therein, are burnt as near as possible to the place of production and while still under pressure, and are used as an engine fuel for the production of useful mechanical work. The waste heat of the gases leaving the engine is utilised in the hydrogenation process. (B) The high-pressure waste gases are utilised as they leave the apparatus in one or more machines of the turbine type. The hydrogen is then recovered from these gases by treating them with steam under pressure, and is returned to the hydrogenating vessel. The carbon dioxide thereby formed may likewise be allowed to expand in a turbine with the production of useful work. A. B. MANNING.

Carbonisation of briquetted fuel. E. GOUTAL and H. HENNEBUTTE (F.P. 632,856, 14.4.27).—Porous charcoal obtained from wood, peat, or lignite, is briquetted, using tar as the binding agent, and the briquettes are carbonised surrounded by the powdered material.

A. B. MANNING.

British Chemical Abstracts-

406

Treatment of gases containing hydrogen and unsaturated hydrocarbons. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 325,309, 26.11.28).—The unsaturated hydrocarbons in gaseous mixtures obtained by the thermal treatment of gases containing hydrocarbons are recovered by adsorption under pressure on activated carbon or other solid adsorbent. The residual compressed gas, principally hydrogen, is utilised in some reaction requiring hydrogen under pressure, *e.g.*, in the destructive hydrogenation of coal, tar, etc.

A. B. MANNING.

Compositions for the purification of gases. COMP. INTERNAT. POUR LA FABR. DES ESSENCES ET PÉTROLES (B.P. 309,585, 27.3.29. Fr., 13.4.28).—Gases from the distillat on or gasification of carbonaceous materials are purified by being passed over a composition comprising a metal or metallic oxide, *e.g.*, of nickel, copper, supported on an inert carrier, *e.g.*, pumice, kieselguhr, the proportions of metal and carrier being such that the composition will not retain more than 10% of its weight o sulphur. This ensures that on regeneration of the composition in a current of air the temperature will not rise sufficiently to reduce appreciably the activity of the metal. A. B. MANNING.

Refining of low-temperature tar, tar oils of any origin, crude benzene, and products obtained by destructive hydrogenation of carbonaceous materials. F. HOFMANN and C. WULFF (B.P. 298,484, 8.10.28. Ger., 6.10.27).—The crude material is treated with 2—3% of a concentrated solution of hydrogen chloride in ethyl or methyl alcohol, or other organic solvent, after a pretreatment, if desired, with gaseous or aqueous hydrogen chloride. The heavier oils are preferably diluted with benzine before treatment. The phenols are refined simultaneously with the neutral oils and may be extracted in pure form from the product. A. B. MANNING.

Simultaneous removal and emulsification of tars from tar-yielding media. T. W. BARBER (B.P. 325,484, 8.10.28).—The tar-yielding medium, e.g., crude petroleum, previously neutralised if necessary, is treated with an alkali (caustic soda) in such a manner that the tars are removed and emulsified at the same time. The apparatus described in B.P. 302,745 and 323,758 (B., 1929, 307; 1930, 270) may be used for adjusting the exact proportion of medium and alkali and for effecting the subsequent emulsification, respectively. A. B. MANNING.

Treatment of asphaltic bituminous and resinous products. P. GIBARD and F. PETIT (B.P. 315,381, 2.11.28. Fr., 13.7.28).—The asphaltic residual oil from any cracking process is treated with an alkaline earth, e.g., about 4-6% of lime, the amount depending on the oxygen content of the asphalt, at a temperature above 300° but below that at which cracking would normally occur, and at atmospheric pressure or above. The asphalt may advantageously be submitted to a preliminary oxidation. It is converted largely into gasoline and non-asphaltic products suitable for retreatment in the cracking process. A. B. MANNING.

Retort [for distillation of shale etc.]. L. G. NILSON, ASST. to INTERNAT. BITUMENOIL CORP. (U.S.P. 1,742,273, 7.1.30. Appl., 15.1.26).—The material is passed through a double-walled, cylindrical, rotary retort. The annular space between the walls is packed with a heat-equalising material, *e.g.*, metal bars, metal filings, or sand, and is divided into sections by rings of heat-insulating material, corresponding with zones of successively higher temperatures within the retort. The retort is surrounded by a combustion chamber which is also divided into sections by vertical walls partially surrounding the retort. It is heated from below by gas burners. A. B. MANNING.

Decomposition of hydrocarbons to produce hydrocarbons of higher mol. wt. T. S. WHEELER, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 324,939, 3.9.28).—Methane or ethane is decomposed by thermal treatment to form aromatic hydrocarbons, after the separation of which the hydrogen is removed from the residual gas prior to further thermal treatment, *e.g.*, by passing over copper oxide at 250°, by diffusion, or by interaction with added carbon monoxide in the presence of a nickel catalyst. A. B. MANNING.

Splitting of hydrocarbons. N.V. DE BATAAFSCHE Petroleum Maatschappij (B.P. 302,349, 21.11.28. Holl., 16.12.27).-Unsaturated hydrocarbons may be obtained at comparatively low temperatures from light hydrocarbons such as propane and butane when the heating is carried out in the presence of halogens or halogen-containing substances. Organic or hydrogen halides, or sulphur-, phosphorus-, and oxygen-containing halogen compounds may be used. Metals and metallic salts may be added as activators. The addition of a few hundredths vol.-% of iodine to propane at 575° causes the production of 15.5% of unsaturated substances, mainly ethylene, whilst at 650° 35.3% of unsaturated substances is obtained. Butane in the presence of carbon tetrachloride at 600° gives butylene 6%, propylene $14 \cdot 3\%$, and ethylene $21 \cdot 9\%$.

T. A. SMITH.

Manufacture of liquid hydrocarbons. J. L. FOHLEN (F.P. 631,927, 14.4.27).—Hydrogen or water-gas, steam, and methane, or ethane are injected into a blastfurnace and the exit gases are led over a nickel, cobalt, or platinum catalyst at 100—450°, preferably under pressure. With a zinc oxide catalyst alcohols are obtained; with aluminium chloride, polymerised products. C. HOLLINS.

Manufacture of light-coloured [oxidation] products from paraffin wax, montan wax, etc. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 324,903, 27.9.28).—Waxes etc. are oxidised to almost colourless products (substitutes for beeswax etc.) by air or oxygen at 120—180° in presence of small amounts of aqueous non-oxidising, strong acids or of an ansolvo-acid. Examples of such catalysts are 0.1% of 45% sulphuric acid, 0.1% of oxalic acid, 0.3% of the ansolvo-acid obtained from zinc chloride and acetic acid, *i.e.*, [ZnCl₂,2AcO]H₂. C. HOLLINS.

Coking of [petroleum] oils. D. R. WELLER and L. LINK, ASSTS. to STANDARD OIL DEVELOPMENT Co. (U.S.P. 1,741,895, 31.12.29. Appl., 8.4,22).—Distillation down to the coke stage is carried out in a horizontal cylindrical still surmounted by a dome of cross-section at least half that of the still. Vapour off-takes from the top of the dome are each at least one sixth of the cross-section of the dome. The period of distillation is expected to be 10—18 hrs., and these offtakes will deal with the vapours evolved during that period. The dome is fitted with a catch-tray and run-off so that waxcontaining oil condensed in the dome may be separately run off. The vapours are carried to a series of fractionating towers the vapour inlets of which are at the bottom. Condensate from the towers may be led off to storage or returned to the still. Cuts may be taken from each tower. The uncondensed vapours leaving the last tower are liquefied in a condenser.

Т. А. Ѕмітн.

Purification of petroleum distillates. M. L. CHAPPELL and G. J. ZISER, ASSTS. to STANDARD OIL CO. OF CALIFORNIA (U.S.P. 1,741,555, 31.12.29. Appl., 20.7.25).—Viscous petroleum oils or lubricating stocks are mixed with about an equal volume of aniline oil and heated to approx. 77° to effect homogeneous dissolution; the mixture is then cooled to below 27° until the saturated hydrocarbons separate from the aniline oil, the latter containing the unsaturated hydrocarbons, sulphur, and asphaltic and resinous compounds in solution. These are subsequently separated from the aniline by distillation in steam. H. S. GARLICK.

Apparatus for refining oil. C. W. STRATFORD and W. S. JAMES (U.S.P. 1,741,887, 31.12.29. Appl., 8.7.26). —Oil is injected through a control valve so that it strikes tangentially the inner surface of one of a pair of vertical cylinders each having openings in each end. Vapours and any entrained liquids are led from the upper opening in the first cylinder and are delivered to the interior of the second cylinder, substantially tangentially, thereby separating vapours from liquids in each of the cylinders. The separated liquids are removed from the lower ends of the cylinders through a liquid seal located exterior to each of the cylinders. H. S. GARLICK.

Oil-purifying apparatus. L. H. CLARK, Assr. to SHARPLES SPECIALTY Co. (U.S.P. 1,741,756, 31.12.29. Appl., 12.5.25).—Oil from electric installations, used crank-case oil, or other oils containing finely-divided carbon or similar impurities, are drawn by means of a pump through a pipe controlled by a valve to a closed heater and passed to a closed agitating tank. Aqueous treating reagent is drawn from a storage tank through a valve-controlled pipe having a by-pass, and passed to the agitating tank. Means are provided for introducing absorptive material into the agitating tank if desired. From the bottom of the agitating tank a valvecontrolled pipe leads to a centrifugal separator. Oil separated from the mixture is discharged into a storage tank. H. S. GARLICK.

Treatment of hydrocarbon oils. C. J. GREEN-STREET, ASST. to GASOLINE CORP. (U.S.P. 1,740,691, 24.12.29. Appl., 4.8.27. Renewed 13.3.29).—Residual oil mixed with superheated steam is passed through cracking coils to well-lagged expansion vessels which also receive heated crude oil which has passed through a topping coil. Unvaporised oil settles out in these vessels and is not retreated. The uncondensed vapours are passed through a series of six further expansion vessels, entering each vessel at the bottom and leaving at the top. A certain amount of condensation takes place in these vessels and the condensed oil is passed again through the cracking coil. The final expansion chamber is cooled by means of a coil so that only benzine vapours are uncondensed. The benzine vapours are passed to a separate condenser. T. A. SMITH.

(A) Fractionation of vapours from pressure stills and the like. (B) Operation of pressure stills. (C, D) Cracking of hydrocarbons. J. E. Bell, Assr. to Sinclair Refining Co. (U.S.P. 1,741,275-7 and 1,741,357, 31.12.29. Appl., [A, B] 24.3.24, [C] 22.1.25, [D] 9.7.24).—The cracking unit consists of vertical tubes arranged in parallel in a furnace setting. A pressure still is arranged to receive hot oil from the upper ends of the heating tubes and a line is also taken from lower portion of the still to the bottom of the heating tubes so that oil may be circulated. Circulation is brought about by means of a pump the bearings of which are kept cool by pumping cool cracking stock into them. A drain for the removal of tar from the pressure still is provided. The cracking stock is preheated by using it as a cooling medium in a special dephlegmator tower in which it does not come in direct contact with the vapours from the still and also in a dephlegmator tower in which it does come in intimate contact with the hot vapours. Vapours from the dome of the pressure still are taken to the first dephlegmator tower up which they pursue a tortuous course through baffles over which cracking stock is flowing to the still. From this tower the vapours proceed to a second similar tower where the baffles are sprayed with condensate or the vapours are taken to a special tower in which the cooling is more definitely controlled. This tower consists of a number of superposed tube-boiler-like units, the vapours passing through the tubes, whilst the shells contain cracking stock. The reflux from the upper units can be distributed in desired amount over the lower units and the temperatures are controlled so that at any part the difference between the temperature of the gases and the cooling fluid is not more than 25°. From this tower cuts may be taken or undesired reflux returned to the pressure still. The vapours from the tower are passed to a condenser. The pumps provide efficient means of controlling each stage of the operation. T. A. SMITH.

Apparatus for evaporating and recovering sulphurous acid from mixtures of hydrocarbons and sulphur dioxide, possessing a large excess of sulphur dioxide. S. G. C. MARKS. From ALLGEM. Ges. f. Chem. Ind. m.b.H. (B.P. 325,315, 28.11.28).-The removal of sulphur dioxide from such mixtures in one stage is uneconomical owing to the large ratio of the gas to hydrocarbon. In continuous plant the sulphur dioxide has all to be raised to the temperature at which the hydrocarbon leaves this portion of the plant. In the present process its removal is carried out in stages, the mixture being passed through a series of vessels. The passage from one vessel to the next is downwards through a steam-jacketed pipe and then through an unjacketed, upward delivery pipe to the next vessel. The flow of steam and extract is countercurrent. The sulphur dioxide exits from the evaporators are connected to a common main. Instead of using separate vessels, a common vessel, which is divided by partitions, may be used. By this method it is possible to raise the temperature of the hydrocarbon extract to 85° at 4—6 atm. when it contains only about 6°_{0} SO₂. This reduces the load on the portion of the plant in which the final traces of gas are removed under vacuum. T. A. SMITH.

Production of motor fuels. S. SCHANZER (DR. WER-NICKE & BEYER) (B.P. 313,115, 17.11.28. Ger., 7.6.28. Addn. to B.P. 301,076; B., 1930, 314).—A mixture containing 2—5% of quinol, which was dissolved in 15 times its weight of benzene, is prepared in mineral oil boiling at 170—200°. Addition of 1% of this mixture to ordinary motor spirit confers improved qualities on the fuel and is 15—20% more economical. T. A. SMITH.

Preparation of a lubricating oil containing rubber. Soc. MARITIME ET INDUSTRIELLE (F.P. 636,242, 20.6.27). —Lubricating oil (100 pts.) is mixed with 0.5—15% of rubber and 5—20% of graphite or molybdenite. The product is characterised by its high viscosity and adhesiveness. A. B. MANNING.

Preparation of stabilised dispersions. H. D. ELKINGTON. From N.V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ (B.P. 324,663, 24.10.28).—Aqueous dispersions of mineral oils, tars, asphalts, rubber, etc. are stabilised by reversing the charge of the dispersed particles from negative to positive; before introducing the reversing agent, however, a protective colloid, e.g., 1-2% of gelatin, is added to the dispersion. Acids, basic dyes, solutions of multivalent metallic salts, positively-charged hydrosols such as freshly precipitated aluminium hydroxide, etc. may be used as reversing agents. A. B. MANNING.

Rotary retort, kiln, or drum. G. CANTIENY, Assr. to INTERNAT. COAL CARBONIZATION CO. (U.S.P. 1,751,127, 18.3.30. Appl., 8.3.24. Ger., 24.3.23).—See B.P. 232,456; B., 1925, 491.

Regenerative heating structure [for retort oven batteries]. J. VAN ACKEREN, Assr. to KOPPERS Co. (U.S.P. 1,749,116, 4.3.30. Appl., 5.10.23).—See B.P. 222,818; B., 1925, 490.

Apparatus for carbonising or distilling materials. S. McEwen, Assr. to Coal OIL EXTRACTION, LTD. (U.S.P. 1,749,641, 4.3.30, Appl., 11.7.29, U.K., 8.6.28).—See B.P. 316,734; B., 1929, 932.

Gas scrubber. W. A. S. CALDER and W. H. PALMER (U.S.P. 1,752,260, 25.3:30. Appl., 14.7.24).—See B.P. 240,224; B., 1925, 945.

Recovery of gas constituents from gas mixtures. M. SCHROEDER (U.S.P. 1,751,103, 18.3.30. Appl., 29.10.24. Ger., 12.8.24).—See G.P. 421,725; B., 1926, 321.

Manufacture of high-compression automotive distillate. C. J. PRATT (U.S.P. 1,752,264, 25.3.30. Appl., 13.7.27).—See B.P. 293,829; B., 1930, 180.

Regeneration or purification of lubricating oils. H. J. YOUNG, ASST. to SWAN, HUNTER & WIGHAM RICHARDSON, LTD. (U.S.P. 1,752,050, 25.3:30. Appl., 22.3.28. U.K., 12.4.27).—See B.P. 292,300; B., 1928, 633.

[Multi-burner] coal-dust furnaces [for locomotives]. G. HAYN (B.P. 307,057, 13.2.29. Ger., 2.3.28).

Burners for liquid fuel. H. D. FITZPATRICK. From C. F. M. VAN BERKEL (B.P. 325,953, 19.1.29).

Apparatus for burning liquid fuel. FILMA OIL BURNERS, LTD., and A. MARSDEN (B.P. 326,388, 25.4. and 29.6.29).

Bringing liquids and gases into contact (B.P. 325,724). Treatment of gases with solids and liquids (B.P. 324,747). Treatment of gases etc. catalytically (B.P. 324,481).—See I. Hydration of olefines (B.P. 324,897). Organic acids and their salts (B.P. 324,538).—See III. Thiocyanates (B.P. 311,725).—See VII. Production of carbon monoxide (U.S.P. 1,742,750). Floth-flotation of ores (B.P. 301,832).—See X. Purification of waste water (B.P. 305,657).—See XXIII.

III.-ORGANIC INTERMEDIATES.

Direct synthetic urea process. H. J. KRASE, V. L. GADDY, and K. G. CLARK (Ind. Eng. Chem., 1930, 22, 289-293) .- Liquid ammonia and liquid carbon dioxide are delivered at controlled rates by means of special pumps to a jacketed steel autoclave with lead lining; in which a reaction time of 1.83 hrs. at 150° 18 allowed for 40% conversion. Calculation of the heat balance on the basis of formation of ammonium carbamate, 40% of which is converted into urea and water, as far as data are available, shows a small balance available over that required to evaporate and heat the liquid reagents supplied, and to heat and melt the carbonate formed. The reaction mixture passes to a still, in which unchanged carbamate is decomposed, the carbon dioxide and ammonia being recovered, whilst the urea solution is discharged. S. I. LEVY.

PATENTS.

Manufacture of ethylene from acetylene. J. Y. JOHNSON. From I. G. FARBENIND, A.-G. (B.P. 325,152, 23:3.29).—Polymerisation is minimised by adding 5— 20% by vol. of water vapour to the acetylene-hydrogen mixture. Preferably the gases are passed through an evaporator containing water at 95—96°. C. HOLLINS.

Hydration of [propylene and higher] olefines. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 324,897, 1.11.28).—Propylene or a higher olefine is forced at a partial pressure above 10 atm. into dilute hydrochloric or sulphuric acid at 150—220° containing a compound of bismuth or copper. An apparatus for continuous working, in which the alcohol is distilled off under pressure as produced, is described. The process may be used to remove propylene etc. from gases containing ethylene. C. HOLLINS.

Production of higher hydrocarbons [from methane]. F. FISCHER (B.P. 319,340, 15.12.28. Ger., 22.9.28).—A tower lined with silica is heated by furnace gases and when sufficiently hot a reverse (downward) current of methane is substituted. As soon as the methane conversion ceases the furnace gases are again led in, and the alternation is repeated as often as desired, the conversion products being removed at the base of the tower. A heat exchange is arranged to preheat the methane and the combustion gases alternately. C. HOLLINS.

Oxidation of organic compounds [hydrocarbons] of high mol. wt. J. Y. JOHNSON. From I. G. FARB-ENIND. A.-G. (B.P. 324,492, 31.12.28).—As oxidising agents, nitrogen oxides, particularly nitrogen peroxide vaporised from the liquid tetroxide, are used at 48—80° and 2—6 atm. pressure. C. HOLLINS.

Manufacture of trichloroethylene. CONSORT. F. ELEKTROCHEM. IND. G.M.B.H. (B.P. 302,321, 14.12.28. Ger., 14.12.27).—In the conversion of tetrachloroethane at about 500° into trichloroethylene the vapour of the former is passed at such velocity over the heated surface that a large proportion remains unchanged and is returned to the entering gas. An output of 50 tons per 24 hrs. per cub. m. of chamber space is reached when $1\cdot 2$ kg. of tetrachloroethane are passed per hour at 460° over pumice impregnated with cupric chloride in a contact tube $3\cdot 8$ cm. in diam. and 27 cm. long.

C. HOLLINS.

Manufacture of α -chloro- α -sulphoacetyl chloride. COMP. DE PROD. CHIM. ET ELECTROMÉTALLURG. ALAIS, FROGES, & CAMARGUE (F.P. 602,395, 25.11.24).— Trichloroethylene and 0.67 pt. of 100% sulphuric acid are refluxed for 20—25 hrs. at 80—88°. C. HOLLINS.

Separation of formic acid from acetic acid. I. G. FARBENIND. A.-G. (B.P. 305,594, 7.2.29. Ger., 7.2.28).—An entraining liquid soluble in acetic acid, but not in formic acid, is added to the mixture of acids. On distillation the azeotropic mixture of formic acid, and added liquid (together with any water present) is first collected and separates into two layers; glacial acetic acid remains in the distilling vessel. Suitable entraining liquids are benzene, trichloroethylene, and carbon tetrachloride. C. HOLLINS.

Recovery of anhydrous fatty acids from dilute aqueous solutions. Soc. ANON. DES DISTILLERIES DES DEUX-SÈVRES (F.P. 636,825, 29.6.27. Belg., 1.7.26 and 23.5.27).—The solution is agitated with an ester of the acid to be extracted, with or without the addition of a hydrocarbon, and the ester layer is subjected to fractional distillation. Thus, 10% acetic acid solution is stirred with ethyl acetate; on distillation of the ester layer, which contains 3% of water, the constant-boiling mixture of ester and water distils at 70.4° and the pure ester at 77°, leaving a residue of pure acetic acid. A 20% solution of acetic acid is extracted with a mixture of 25% of benzene and 75% of ethyl acetate.

A. R. POWELL.

Production of acetaldehyde from ethyl alcohol. J. W. WOOLCOCK, and IMPERIAL CHEM. INDUSTRIES, LTD. (B.P. 325,105, 15.2.29).—The vapour from 95% alcohol is passed with 35—75% of the oxygen necessary for oxidation, with or without steam, over a dehydrogenating catalyst (silver gauze) at 450—550°. A heat exchange is used to preheat the gases. With an alcohol-air ratio $1:1\cdot1$ by vol., 20% of the aldehyde formed results from dehydrogenation and the exit gases contain 10% of hydrogen. C. HOLLINS.

Manufacture of ethyl ether. K. E. STÄRBLOM (Swed.P. 60,916, 11.6.24).—Alcohol vapour is led over kaolin at temperatures below that at which ethylene is formed. C. HOLLINS.

Manufacture of dihalogenoethyl esters. G. B. ELLIS. From Soc. DES USINES CHIM. RHÔNE-POULENC (B.P. 325,115, 19.2.29).—Vinyl esters are treated with halogen below 0°, preferably in presence of diluent gas and/or liquid, e.g., carbon tetrachloride or benzene. The preparation of $\alpha\beta$ -dichloroethyl acetate, b.p. 55— 56°/5 mm., $\alpha\beta$ -dibromoethyl acetate, b.p. 84°/5 mm., $\alpha\beta$ -dichloroethyl chloroacetate, and $\alpha\beta$ -dibromoethyl butyrate is described. C. HOLLINS.

Manufacture of organic acid and their salts. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 324,538, 8.2.29).—Oxidation products of paraffin wax etc. are saponified with caustic alkali, and the resulting soap solution is diluted and emulsified with light petroleum at 70—100°; clear soap solution is separated by centrifuging, and the emulsion is split by shaking with methyl or ethyl alcohol. The soap solutions are acidified to precipitate pure fatty acids. C. HOLLINS.

Preparation of organic peroxides. J. STRAUB (B.P. 309,118, 11.12.28. Holl., 5.4.28).—By preparing two or more acyl peroxides from mixtures of acid chlorides in the same vessel a low-melting and/or easily super-cooled mixture of peroxides is obtained. C. HOLLINS.

Manufacture of thiocarbamide from cyanamide. Soc. D'ETUDES CHIM. POUR L'IND. (F.P. 630,883, 9.2.27. Switz., 11.2.26).—Calcium sulphide is added to calcium cyanamide in water and carbon dioxide is led in at 75° and 5 atm. pressure. The nascent hydrogen sulphide reacts as formed to give thiocarbamide. C. HOLLINS.

[Preparation of] diguanidines. M. HEVN, Assr. to SCHERING-KAHLBAUM A.-G. (U.S.P. 1,737,192, 26.11.29. Appl., 16.7.26. Ger., 4.8.25).— $\alpha\omega$ -Hexylenediamine or other polymethylenediamine is added to concentrated aqueous S-methylisothiocarbamide sulphate, and the mixture warmed until no more methyl mercaptan escapes. The NN'-diguanyl derivative of the diamine is produced. C. HOLLINS.

Manufacture of organic nitrogen compounds. KNOLL & Co., and K. F. SCHMIDT (G.P. 455,585, 15.4.25. Cf. also B.P. 257,418 and 250,897; B., 1926, 932; 1927, 172).—Further to U.S.P. 1,637,661 (B., 1927, 974), cyclopentanone gives with azoimide and zinc chloride tetrahydrobenztetrazole [tetrahydro-1:2-pyrido-1:

5-tetrazole] $\begin{array}{c} CH_2 \cdot CH_2 \cdot N \cdot N \\ | \\ CH_2 \cdot CH_2 \cdot CH_2 \cdot C \cdot N \end{array}$ N, m.p. 138°, b.p. 168– 170°/6 mm. C. Hollins.

Production of dye intermediates etc. [Conversion of aroylaromatic acids into aromatic acids.] H. A. E. DRESCHER, D. A. W. FAIRWEATHER, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 324,935, 4.8.28).—Aroylaromatic acids or their alkaline-earth salts are heated for a few minutes at 300—350° in presence of the oxide or hydroxide of an alkaline-earth metal. o-Benzoylbenzoic acid with lime gives calcium benzoate; calcium 2- α -naphthoylbenzoate with lime gives calcium α -naphthoate and benzoate. C. HOLLINS.

Manufacture of water-soluble condensation products. [Synthetic tanning agents and resists for wool or silk.] A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 321,190, 28.6.28. Cf. B.P. 320,056; B., 1930, 315).—A mixture of an aromatic hydrocarbon or phenol and a natural resin is sulphonated and condensed with a benzyl chloride. The products may be salted out, and are used as tanning agents and as resists for wool and silk against direct dyes. Examples are : naphthalene and colophony are sulphonated with 100%sulphuric acid at 40—50°, and benzyl chloride is added ; colophony, crude cresol, and benzyl chloride ; colophony, phenol, and o-chlorobenzyl chloride. C. HOLLINS.

Hydrogenation catalysts. COMP. DE PROD. CHIM. ET ELECTROMÉTALLURG. ALAIS, FROGES, & CAMARGUE (F.P. 609,786, 28.4.25).—Mixtures of sodium and potassium, e.g., NaK or NaK₂, are more active catalysts than the single metals for the hydrogenation, e.g., of naphthalene. C. HOLLINS.

Manufacture of [wax-like] chlorinated compounds of naphthalene. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 324,774, 21.12.28).—Molten naphthalene is treated with chlorine below 130° in presence of antimony chloride, phosphorus chlorides, sulphur, or iodine, to give wax-like products.

C. HOLLINS.

Manufacture of halogenoarylthioglycollic acids. I. G. FARBENIND. A.-G. (B.P. 299,327, 22.10.28. Ger., 22.10.27).—A suitable arylamine is thiocyanated in the p-position by the method of B.P. 257,619 (B., 1928, 516), hydrolysed to the p-aminothiol, which is condensed with chloroacetic acid, the amino-group being finally exchanged for halogen by Sandmeyer's reaction. The following thioglycollic acids are described : 5-aminom-tolyl- (m.p. 172°), 5-chloro-m-tolyl- (m.p. 127—129°), 4-chloro-6-amino-m-tolyl- (m.p. 120°), 4 : 6-dichloro-mtolyl- (m.p. 112°), 2-amino-p-5-xylyl- (m.p. 185°), and 2-chloro-p-5-xylyl- (m.p. 96°). C. HOLLINS.

Manufacture of bromine-substituted arylthioglycollic acids. O. Y. IMRAY. From I. G. FARBEN-IND. A.-G. (B.P. 324,484, 20.12.28).—o-Cyanoarylthioglycollic acids or the corresponding o-amides are treated with bromine in a solvent (concentrated sulphuric acid) at 20—25°. The preparation of 5-chloro-6-bromo-2carbamyl-m-tolylthioglycollic acid, m.p. 195—196°, the corresponding 2-cyano-compound, m.p. 197—200°, and bromo-4-cyano-m-methoxyphenylthioglycollic acid, m.p. 186—187°, is described. C. HOLLINS.

Manufacture of o-arylcarboxyamidothioglycollic [o-amidocarbonylarylthioglycollic] acids. I. G. FARBENIND. A.-G. (B.P. 310,757, 29.4.29. Ger., 28.4.28). -o-Cyanoarylthioglycollic acids are hydrolysed to the carboxylamides by means of aromatic sulphonic acids, e.g., sulphonated phenol or naphthalene. C. HOLLINS.

Manufacture of condensation products from 2-methylene-1:3:3-trimethylindolines. Soc. CHEM. IND. IN BASLE (B.P. 312,174, 21.5.29. Switz., 19.5.28).—2 Mols. of 2-methylene-1:3:3-trimethylindoline are condensed with formaldehyde in aqueous alcohol at 30—35°. The white, crystalline product, m.p. 124°, becomes coloured on exposure to air, forming a red basic dye. C. Hollins.

Production of chloro-derivatives of N-dihydro-1:2:2':1'-anthraquinoneazine. J. H. SACKS, Assr. to E. I. DU PONT DE NEMOURS & Co. (U.S.P. 1,739,736, 17.12.29. Appl., 29.7.25).—Indanthrone is suspended in 52% sulphuric acid (12 pts.) containing sodium nitrate (1 pt.), and sodium chloride (2 pts.) is added at 45° during 3 hrs.; the product contains 5—6% Cl. With more concentrated sulphuric acid (78%) and more salt (3 pts.) 9—10% Cl may be introduced. C. HOLLINS.

Manufacture of o-anisidine and o-aminophenol ethers. J. TCHERNIAC (U.S.P. 1,752,121, 25.3.30. Appl., 29.9.27. U.K., 2.10.26).—See B.P. 282,907; B., 1928, 152.

Production of acylresorcinols. A. R. L. DOHME. Assr. to SHARP & DOHME, INC. (U.S.P. 1,750,299, 11.3.30, Appl., 16.4.25).—See B.P. 250,893; B., 1927, 59.

Purification of quinoline and quinaldine. M. WYLER, Assr. to BRIT. DYESTUFFS CORP., LTD. (U.S.P. 1,750,082, 11.3.30. Appl., 5.5.27. U.K., 6.9.26).— See B.P. 276,156; B., 1927, 809.

Catalytically reducing anthraquinone compounds and hydrogenated products derived therefrom. J. von BRAUN and O. BAYER, Assrs. to GEN. ANILINE WORKS, INC. (U.S.P. 1,751,670, 25.3.30. Appl., 27.2.26. Ger., 3.3.25).—See B.P. 248,759; B., 1927, 597.

Preparation of [aromatic] diazosulphamic acids. K. and W. SCHIRMACHER, Assrs. to GEN. ANILINE WORKS, INC. (U.S.P. 1,750,057, 11.3.30. Appl., 17.2.27. Ger., 22.2.26).—See B.P. 266,388; B., 1928, 327.

Manufacture of dinaphthylene dioxide quinone. L. ZEH, Assr. to GEN. ANILINE WORKS, INC. (U.S.P. 1,749,014, 4.3.30. Appl., 4.10.28. Ger., 13.10.27).— See B.P. 298,640; B., 1930, 362.

Liquid hydrocarbons (F.P. 631,927).—See II. Azo intermediates (B.P. 299,331). Benzoylated aminoanthraquinones (B.P. 324,311).—See IV.

evolution and abte IV.-DYESTUFFS. In provide

PATENTS.

Manufacture of brown wool dyes. I. G. FARBENIND. A.-G., Assees. of H. POLIKIER and A. HASSELBACH (G.P. 455,033, 3.6.26).—A *m*- or *p*-phenylenediamine is condensed with 2 mols. of 1-chloro-4-nitrobenzene-2sulphonic acid, the nitro-groups are reduced, and the product is finally condensed with 2 mols. of dinitrated chloro- or *p*-dichloro-benzene. From *p*-phenylenediamine, 1-chloro-4-nitrobenzene-2-sulphonic acid (2 mols.), and 1-chloro-2: 4-dinitrobenzene (2 mols.) a yellow-brown wool dye (annexed formula) is obtained.



m-Phenylenediamine, with 2:6-dinitro-1:4-dichlorobenzene as end reactant, gives a red-brown. C. HOLLINS.

Manufacture of azo dyes and intermediate products containing the thiazole ring, with the aid of cyanuric halides. Soc. CHEM. IND. IN BASLE (B.P. 299,331, 22.10.28. Switz., 22.10.27).-The cyanuric chloride method (cf. B.P. 221,843 and 209,723; B., 1924, 937; 1925, 437) is employed for the introduction of a thiazole residue into azo dyes or into intermediates capable of conversion into azo dyes. In the 124 examples the thiazole derivative used is dehydrothio-ptoluidine (D.H.T.), its sulphonic acid (D.H.T.S.), primulinesulphonic acid or dehydrothio-m-4-xylidinesulphonic acid. The following are typical: Cyanuric chloride with 2 mols. of o-p-toluenesulphonyl-H-acid \rightarrow cresidine and 1 mol. of D.H.T.S. (yellowish-red on cotton); cyanuric chloride with 1 mol. of H-acid and 1 mol. of D.H.T.S., finally coupled with diazotised anthranilic acid (pink; reddish-violet on coppering or when pre-coppered); cyanuric chloride with 1 mol. of p-phenylenediaminesulphonic acid and 1 mol. of D.H.T.S., diazotised and coupled with acetoacetic anilide (greenish-yellow) ; p-nitroaniline-o-sulphonic acid >cresidine->compound from cyanuric chloride with 1 mol. of H-acid and 1 mol. of D.H.T. (greenish-blue) ; anthranilic acid->compound from cyanuric chloride with J-acid, D.H.T.S., and aniline (coppered, orange-brown); cyanuric chloride with 1 mol. of 4-chloro-m-phenylenediamine and 1 mol. of D.H.T.S., diazotised and coupled

with compound from cyanuric chloride with 1 mol. of J-acid and 1 mol. of p-phenylenediamine-o-sulphonic acid, developed on the fibre with β-naphthol (red). C. HOLLINS.

Dyes of the phenonaphthazine series obtained from 3-arylamino-1:8-naphthasultam compounds. W. NEELMEIER and T. NOCKEN, Assrs. to GEN. ANILINE WORKS, INC. (U.S.P. 1,723,199, 6.8.29. Appl., 21.7.26. Ger., 28.7.25).-A 3-arylamino-1:8-naphthasultam, especially when carrying a 6-sulphonic group, is condensed with a p-nitrosodialkylaniline or oxidised with a p-diamine. 3-Anilino-1:8-naphthasultam-6-sulphonic acid with nitrosodimethylaniline hydrochloride gives a red-violet dye (annexed formula);



the p-tolyl compound is a violet dye. By the use of pphenylenediaminesulphonic acid a red results; the oxidation of 3-anilino-N-methyl-1:8-naphthasultam with p-aminodimethylaniline-3-sulphonic acid for a violet is also described. C. HOLLINS.

Production of dyes and dye intermediates [benzoylation of aminoanthraquinones]. J. F. DUNWORTH, J. THOMAS, and SCOTTISH DYES, LTD. (B.P. 324,311, 16.7.28) .- An aminoanthraquinone is treated with large excess of benzoyl chloride (or a substituted benzoyl chloride) in chloro- or nitro-benzene at about 100°; the product may be filtered off cold, and the excess benzoyl chloride recovered or the filtrate used

for further benzoylations. The benzoylation of 1amino-, 5-chloro-1-amino-, and 1:5-diamino-anthraquinones is described. C. HOLLINS.

Manufacture of substitution products of dibenzpyrenequinones. J. Y. JOHNSON. From I. G. FARB-ENIND. A.-G. (B.P. 324,964, 8.10.28).-2:3:7:8-Dibenzpyrene-1:6-quinone (from 1:5-dibenzoylnaphthalene) is mononitrated, *e.g.*, with 96% nitric acid in nitrobenzene at 80—85°, and the nitro-group in the product is replaced by 11 product is replaced by chlorine or bromine by boiling with benzoyl chloride or bromide; or the mononitrocompound is treated with chlorine in trichlorobenzene at 175° to give dichlorodibenzpyrenequinone. The amino-group in the reduced mononitroquinone may be replaced by iodine, or by the cyano- or thiocyanogroup. All these products are yellow vat dyes. Methylation of the hydroxydibenzpyrenequinone obtained from the aminoquinone gives an orange vat dye.

C. HOLLINS.

Manufacture of acid dyes of the triphenylmethane series. A. CARPMAEL. From I. G. FARBEN-IND. A.-G. (B.P. 324,966, 10.10.28).-A non-sulphonated arylamine is condensed with a benzaldehyde carrying an o-sulphonic group (cf. B.P. 21,365 of 1900; B., 1901, 1205). Superior light-fastness is claimed. Examples are: benzaldehyde-2: 4-disulphonic acid with m-2xylidine (bluish-violet); benzaldehyde-o-sulphonic acid with o-toluidine (violet). C. HOLLINS.

[Manufacture of] sulphur dye pastes. E. VOETTER, Assr. to Gen. Aniline Works, Inc. (U.S.P. 1,749,963, 11.3.30. Appl., 24.2.28. Ger., 16.6.25).—See B.P. 309,061; B., 1929, 551.

Dyes which are alanines of the anthraquinone series and their derivatives. W. DUISBERG, W. HENTRICH, and L. ZEH, Assrs. to GEN. ANILINE WORKS, INC. (U.S.P. 1,749,242, 4.3.30. Appl., 16.1.26. Ger., 31.1.25).—See B.P. 246,840; B., 1927, 326.

Azo dyes derived from aminoacylaminosalicyldiphenylsulphones. W. NEELMEIER and W. HENTRICH, Assrs. to Gen. Aniline Works, Inc. (U.S.P. 1,749,836, 11.3.30. Appl., 5.11.26. Ger., 13.1.25).—See F.P. 609,136; B., 1927, 646.

Products from 2-methylene-1:3:3-trimethylindoline (B.P. 312,174). N-Dihydroanthraquinoneazine derivatives (U.S.P. 1,739,736).-See III.

V. -- FIBRES ; TEXTILES ; CELLULOSE ; PAPER.

Esterified cotton. A. E. WOODHEAD (J. Soc. Dyers and Col., 1930, 46, 69-74).-The preparation and physical and chemical properties of immunised cotton, of which about half the cellulose is in the form of the toluene-p-sulphonyl ester, are described. The fibre is found to consist of an inner core of unaltered cellulose surrounded by a tube of the above ester, which, unlike most cellulosic esters, is relatively stable to alkali. Immunised cotton is now being largely replaced by "passive" cotton, which consists of the mono- and diacetates, prepared by the action of acetic acid, acetic anhydride, and an acid catalyst on cellulose. Passive cotton is softer and more flexible than immunised cotton

CL. V.-FIBRES ; TEXTILES ; CELLULOSE ; PAPER.

and possesses slightly greater resistance to direct dyes, but slightly less to alkaline agents. Esterified cotton is, broadly speaking, undyed by direct cotton colours. A good reserve is also obtained with suitable sulphur colours dyed below 40°, and with some vat colours dyed at 30-35°. The dyeing properties of esterified cotton agree with those of cellulose acetate silk, the most important colours for the purpose being the S.R.A. Duranol, Setacyl, Cellit, Cibacet, and other ranges. Immunised and passive cotton are not injuriously affected by boiling water. The esterification of already dyed cotton is also discussed. Selected vat and direct dyes are suitable, the latter becoming faster to light, washing, and bleaching. The application of esterified cotton in textile fabrics is discussed. The preparation and properties of amidated cotton, which, however, is not yet a commercial commodity, are described. Bright shades having good fastness to washing are obtained on amidated cotton, using acid colours in a neutral or acid bath. N. CHAPPELL.

Isoelectric point of silk fibroin. T. G. HAWLEY, JUN., and T. B. JOHNSON (Ind. Eng. Chem., 1930, 22, 297—299).—Degummed dried silk can be so finely ground by prolonged treatment in a ball mill that 80% is retained in clear aqueous solution after treating with water and passing through a Berkefeld candle. The isoelectric range determined by cataphoresis and by flocculation was found to be between $p_{\rm H}$ 1.4 and 2.8, with a probable isoelectric point at about $p_{\rm H}$ 2.1. S. I. LEVY.

Swelling and dissolution processes of cellulose and its derivatives. K. HESS (Papier-Fabr., 1930, 28, 169-177).-Investigations have been made of the phenomena attendant on the swelling and dissolution of cellulose in the system cellulose-cuprammonium-sodium hydroxide, and of cellulose esters and ethers in organic liquids such as cyclohexanol, pyridine, chloroform, etc. under various conditions. Absorption of copper and sodium hydroxide by the cellulose, the degree of swelling, and amount of cellulose dissolved under different conditions of copper and sodium hydroxide concentrations of the liquid phase have been measured, and comparisons are made between the Röntgen diagrams obtained under the different experimental conditions. With increasing copper concentration of the liquid, the absorption both of copper and sodium hydroxide increases rapidly up to a point and then respectively decreases and increases very slowly. X-Ray analysis shows one new diagram at the turning point of the copper-absorption curve and a second for still higher concentrations. It is concluded that these diagrams indicate the presence of new copper-alkali-cellulose compounds, each of which predominates according to the copper concentration of the liquid. The degree of swelling and the amount of cellulose dissolved increase with the copper absorption, whilst the amount of dissolved cellulose first increases and then decreases rapidly with increasing sodium hydroxide concentration of the liquid. The reversibility of the absorption and Röntgen diagram effects and the characteristics of the diagrams obtained from cellulose derivatives swollen in organic solvents are discussed. Cellulose acetate gives different diagrams at different temperatures of treatment, and examination of the

swelling effects by means of these diagrams is very complicated, especially as mixed diagrams may be obtained. B. P. RIDGE.

Viscose. XXXIII. Spinning experiments with viscose prepared from unaged alkali-cellulose. G. KITA, T. NAKASHIMA, S. OOHORA, and J. MURAKAMI (J. Cellulose Inst., Tokyo, 1930, 6, 36-38).-In order to observe the importance of ageing alkali-cellulose from the point of view of producing stronger threads, unaged alkali-cellulose was steeped for various times from 30 min. to 3 weeks at temperatures of 8-10° and 25-28°, and threads were spun from the viscoses subsequently prepared. In no case were specially strong threads obtained. It is concluded that a special reaction occurs in ageing, which is not occasioned by longer steeping, but which is of advantage in the manufacture of artificial silk. Probably oxidation of the alkali-cellulose is to some extent advantageous, but this should be uniform throughout the mass and not limited to one part only. The viscosity in cuprammonium of the threads obtained was determined and threads from the longer-steeped alkali-cellulose were found to give the most viscous solutions. This may depend on the fact that the dissolution of hemicellulose by the sodium hydroxide is of greater importance than the action of the alkali on the cellulose itself. B. P. RIDGE.

Beating of [paper] pulp. VI. Wet and dried pulps. M. NAKANO (J. Cellulose Inst., Tokyo, 1930, 6, 31-35; cf. B., 1930, 235).-The rate of increase of the degree of beating, and the properties of finished papers obtained from them, have been investigated for wet, air-dried, and hot-dried (100-110°) sulphite pulps. For the same time of beating the degree of wetness is highest for wet pulp, whilst air-dried pulp is next in order. For both the same degree of wetness and time of beating, wet pulp gives papers of the highest bursting and tensile strengths, elongation, and relative transparency. Strength differences between the wet and the dried pulps are a maximum for sheets formed without beating. The high strength of the wet-pulp paper formed without beating is ascribed to adhesive forces due to the colloidal state of the surface of the wet-pulp fibres. Wet pulp suffers an irreversible colloidal change of fibre surface on drying. B. P. RIDGE.

Chemistry and papermaking. A. S. KLEIN (Papier-Fabr., 1930, 28, 193-200, 213-219).—A summary and bibliography of current theories relating to the constitution, swelling, and "hydration" of cellulose, the strength of paper, sheet-formation, and sizing.

T. T. POTTS.

[Electrical] strength of paper for cables. A. GYEMANT (Wiss. Veröff. Siemens Konz., 1930, 8, [3], 191–202).—Below 75% relative humidity, unimpregnated cable-paper has a resistance to electrical rupture which is independent of the humidity of the air. Two glazed papers which showed a 16:1 difference in porosity with regard to air had electrical strengths in the ratio $1:1\cdot7$. The resistance to rupture is some 10—15% greater for a direct potential than for an alternating potential (maximum value). In the case of multiple layers of paper the resistance to rupture decreases on repeating the test, and remains at this value on

further repetitions. The theory of these results is discussed. W. E. DOWNEY.

Consistency in the application of coatings to paper. R. M. COBB and D. V. LOWE (J. Rheology, 1930, 1, 158-166).-By plotting apparent viscosity of colour mixtures against percentage vehicle, papercoating pulps may be divided into three classes, which correspond to divisions based on mill experience. Results obtained with the Gardner mobilometer and the de Noüy tensiometer do not indicate the superior ability of soft-sized mixtures to stay in place and give a perfect coating. Apparent yield value, as determined by the mobilometer intercept, is without significance in this case. The tensiometer indicates that the troublesome pulps affect the surface tension of the vehicle adversely. Considerable seepage of casein into the paper surface occurs, resulting in a separation of vehicle and pigment; this indicates that the mobility of the layer of coating mixture in immediate contact with the paper surface cannot be the same as that of the coating mixture as measured by ordinary consistency tests before it is applied to paper. The difference in behaviour of soft- and hard-sized coatings can only be explained by consideration of (a) the internal structure of the suspension as indicated by the apparent viscosity, and (b) the change in composition occurring at the liquid-solid boundary during the application of the E. S. HEDGES. coating to paper.

Capillary siphons [for paper-ruling]. E. C. BINGHAM and D. FIGLIOLI (J. Rheology, 1930, 1, 167-172) .- A description is given of capillary siphons, which are used for the continuous ruling of ink-lines on paper, the ink being carried from a saturated flannel by means of a woollen thread. Experiments have shown that a flannel will hold 5.5 times its own weight of ink at saturation, and the ink ceases to flow in drops from the thread when the flannel becomes 90% saturated. When the flannel becomes less than 55% saturated, it is no longer possible to withdraw ink from the thread by means of dry blotting paper. The functioning of the machine depends on a high percentage of saturation in the flannels. Experiments are also described on the effects of varying the height of the siphon, the number of threads, and the structure of the threads.

E. S. HEDGES.

PATENTS.

Manufacture of preparations for oiling fibrous materials. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 324,967, 27.10.28).—The preparation comprises a mixture of unsaturated acids obtained by eliminating water from the oxidation products of organic compounds of high mol. wt., e.g., paraffin hydrocarbons or waxes, or from the acids separated therefrom, or from mixtures of such acids with their esters, anhydrides, and lactones. These unsaturated acids have a lower viscosity than olein, show no tendency to resinify, remain fluid above 0°, and are not liable to spontaneous ignition when finely distributed on fibres. They readily emulsify with small quantities of alkalis and dissolve when completely neutralised. Thus washed raw wool may be treated with an emulsified mixture of unsaturated acids obtained by distilling at 100-300° the hydroxyfatty acids resulting from the oxidation of paraffin wax (cf. B.P. 322,427; B., 1930, 315). D. J. NORMAN.

Manufacture of substitutes for catgut. P. Bost (B.P. 310,884, 1.5.29. Ger., 2.5.28).-An unsterilised catgut substitute is produced by spinning animal fibres obtained from muscle flesh which has been leached, freed from grease, and hardened. F. R. ENNOS.

Production of artificial threads by the stretchspinning process. Courtaulds, Ltd., W. F. Hollely, and G. D. BOND (B.P. 325,714, 9.3.29).-The lower end of the spinning funnel used in the spinning of cuprammonium artificial silk is provided with a detachable tip having a longitudinal slot so that it can be removed, together with any deposit of copper hydroxide formed thereon, without interruption of the production of the thread. F. R. ENNOS.

Production of artificial filaments, threads, bands, sheets, films, etc. from aqueous cellulose solutions. H. KINDERMANN (B.P. 324,963, 4.12.28).-Cellulose solutions with a low alkali content are spun into a coagulating bath containing 35-40% of zinc chloride at 50-60°, the product being subsequently hardened in water or dilute acid. [Stat. ref.]

F. R. ENNOS. Dry-spinning of solutions of cellulose derivatives. BRIT. CELANESE, LTD., J. F. BRIGGS, and R. P. ROBERTS (B.P. 325,233, 13.8.28).-The uniformity and character of artificial filaments dry-spun in countercurrent to an evaporative medium are improved if additional evaporative medium is introduced into the current in the region of the spinning jet, preferably in the plane of the jet face or on the side remote from the filaments. Suitable devices for this purpose are described.

D. J. NORMAN.

Manufacture of artificial silk. M. LEON, and HARBENS (VISCOSE SILK MANUFRS.), LTD. (B.P. 325,605 and 325,617, [A] 28.11.28, [B] 6.12.28).-A sizing or adhesive material is added (A) to the viscose prior to spinning, (B) to the coagulating bath, and the spun threads are washed with cold water without removing the size and dried in individual lengths (i.e., not in bobbins or packages), whereby the filaments are bound together while leaving the threads supple for subsequent treatment. F. R. ENNOS.

Production of artificial silk and the like. B. BORZYKOWSKI (B.P. 311,391 and 325,246, 9.8.28. Ger., 11.5.28).-(A) After being washed and subjected to any desired after-treatment such as desulphurising, bleaching, dyeing, or softening while on the spinning bobbin or in the spun cake, the artificial silk is brought directly into the wound form necessary for textile manufacture without intermediate re-winding. (B) For carrying out the process described in (A) the spun cake is held in position, by an inner and an outer elastic, perforated sleeve or ring, inside a double-walled spinning pot having a space between its outer wall and its inner perforated wall for passage of the treating liquids. F. R. Ennos.

Cellulose ether film and composition for making the same. S. J. CARROLL, ASST. to EASTMAN KODAK CO. (U.S.P. 1,716,418-20, 11.6.29. Appl., 9.8.26).-Waterinsoluble cellulose ethyl ether is compounded with a

volatile thinner (e.g., methyl acetate and 10% of methyl alcohol) and (A) tribromophenol, (B) bromocamphor, or (c) bromobenzene or a homologue, with enough alkali to give $p_{\rm H} > 7$. Heat-resistant films are obtained.

C. HOLLINS.

Manufacture of cellulose ethers. I. G. FARBEN-IND. A.-G. (B.P. 305,946, 11.2.29. Ger., 10.2.28).— Cellulose ethers containing $1\frac{1}{2}$ — $2\frac{1}{2}$ mols. of alkyl per mol. of cellulose ($C_6H_{10}O_5$) are produced by treating alkali-cellulose with a mixture of alkyl and aralkyl halides in the proportion of 10—30 mols. of the former and 2 mols. of the latter per mol. of cellulose, the temperature and pressure being such that the formation of free acid from the excess of alkylating agent is avoided. F. R. ENNOS.

Manufacture and treatment of cellulose esters. H. DREYFUS (B.P. 325,224, 13.8.28).-The ripening of cellulose acetate or other cellulose ester is carried out in an organic medium in which the primary cellulose acetate is insoluble and in which the ripening agent, e.g., water, is soluble in sufficient quantity for ripening to take place satisfactorily. A suitable medium is ether, and may, if desired, be used as a diluent in the acetylation process itself. Thus cotton cellulose is soaked in glacial acetic acid and sulphuric acid for 3-12 hrs. at the ordinary temperature and is then introduced into an ether-acetic anhydride mixture. Acetylation is conducted under reflux at 30-35° until the desired degree of acetylation is attained. Water is then added and the ripening carried out at 30-35°.

D. J. NORMAN.

Manufacture of cellulose esters. H. DREYFUS (B.P. 325,231, 13.8.28).—After pretreatment with an organic acid (formic or acetic) the cellulosic material is esterified with an acid anhydride and a catalyst while in suspension in an organic medium containing a non-solvent for the cellulose ester in which water is soluble to an appreciable extent, *e.g.*, ether mixed, if desired, with benzene (cf. B.P. 325,224; preceding).

F. R. ENNOS.

Manufacture of highly viscous acetylcellulose soluble in acetone. DR. A. WACKER GES. F. ELEKTRO-CHEM. IND. G.M.B.H., and W. GRUBER (B.P. 325,209. 11.10.28) .- Triacetylcellulose may be rendered soluble in acetone by treating it below 30° with an acid salt (containing water of crystallisation) of a heavy metal belonging to group I or II or with a mixture of such salts with each other or with other acid or neutral Thus triacetylcellulose is dissolved in glacial salts. acetic acid and treated with ZnCl., HCl, 2H.O. After about 3-8 hrs. at 20° the product is completely soluble in acetone. When zinc chloride is used as the acetylation catalyst the above compound may be formed in the reaction mixture itself. Other suitable compounds include CaCl₂,6H₂O and 3HgCl₂,4HCl,14H₂O.

D. J. NORMAN.

Apparatus for the rapid and homogeneous transformation of alkali-cellulose into viscose. L. C. P. JARDIN (B.P. 310,495, 12.10.28. Fr., 28.4.28). —The alkali-cellulose is crushed, rolled, and triturated with carbon disulphide in a rotary drum of polygonal cross-section by the violent impact of leaden balls on the sides of the drum. F. R. ENNOS. Maintaining the concentration of magnesium sulphate spinning baths for viscose. BRIT. ENKA ARTIFICIAL SILK CO., LTD., Assees. of N.V. NEDERL. KUNSTZIJDEFABR. (B.P. 325,763, 28.5.29. Holl., 9.4.29). —Equimolecular proportions of concentrated sulphuric acid and magnesium carbonate are added to the spinning bath. F. R. ENNOS.

Manufacture of chemical products from wood. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 325,512, 19.11.28).—After being previously washed or deresinified, the wood is heated with an alkaline reagent, together with a metallic oxide (e.g., of zinc, copper, or iron) if desired, and an alkylating or aralkylating agent at ordinary or increased pressure or in the superheated vapour of the latter reagent, with or without the addition of a diluent (benzine), a solvent or swelling agent (benzene), and a catalyst (copper powder). [Stat. ref.] F. R. ENNOS.

Manufacture of pressed or moulded articles. H. P. BAYON. From MAGNASCO ROGGERO & Co. (B.P. 325,281, 16.11.28).—In the manufacture of moulded or laminated materials by impregnating a cellulose base with synthetic resins, a more complete impregnation is obtained if the cellulosic material be pretreated with a dilute (10%) solution of an oxidising acid, *e.g.*, nitric acid either alone or in admixture with sulphuric acid. The material is then washed and dried. D. J. NORMAN.

Absorbent paper. E. I. DU PONT DE NEMOURS & Co. (B.P. 313,085, 1.6.29. U.S., 6.6.28).—A permanent curl may be imparted to the fibres of cellulose pulp, e.g., mechanical wood pulp, sulphite pulp, pulps made from linen, jute, etc., by treating the pulp with reagents which exert a mercerising effect on cellulose, e.g., 18% caustic soda solution at 20—60°. The treated and washed fibres are then converted into paper optionally after admixture with untreated stock.

D. J. NORMAN.

Manufacture of waterproof paper or pasteboard. I. G. FARBENIND. A.-G. (B.P. 301,807, 5.12.28. Ger., 5.12.27. Addn. to B.P. 289,063; B., 1930, 185).— From 0.5 to 10% or even 50% of the higher fatty acid esters of cellulose described in the prior patent is incorporated with the pulp in the beater and the finished paper or board is calendered at $110-120^\circ$.

D. J. NORMAN.

Manufacture of cigarette paper. B. SEFERIADIS (B.P. 325,125, 27.2.29).—Cigarette paper which on combustion is free from any disagreeable odour is obtained by incorporating with the pulp 3-5% of a gum resin, e.g., gum mastic. The resin may be macerated for 24 hrs. in acetone-alcohol and then (a) introduced into the beater at the end of the beating operation, or (b) dissolved in acetone and mixed with part of the calcium carbonate to be used as filler. D. J. NORMAN.

Sizing of paper. L. F. C. GIRARDET (F.P. 635,419, 2.6.27).—The size is prepared by treating colophony with cold sodium hydroxide solution and adding aluminium sulphate just prior to mixing the size with the paper pulp. A. R. POWELL.

Treatment of crude fibres and textile fabrics. R. H. POTT, ASST. to CHEM. FABR. POTT & CO. (U.S.P. 1,750,430, 11.3.30. Appl., 22.1.23. Ger., 15.6.21).— See B.P. 248,814; B., 1926, 403.

Isolation of benzyl cellulose. E. DÖRR, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,751,685, 25.3.30. Appl., 13.8.27. Ger., 17.8.25).—See B.P. 265,491; B., 1927, 296.

Treating residual liquors accruing from the treatment of cellulose materials. P. A. BARBOU, Assr. to Soc. BARBOU & CIE. (U.S.P. 1,749,557, 4.3.30. Appl., 5.4.27. Fr., 21.4.26).—See B.P. 269,909; B., 1928, 814.

Production of stencil sheets for use in duplicating. A. DE WAELE, ASST. to D. GESTETNER, LTD. (U.S.P. 1,749,241, 4.3.30. Appl., 3.5.28. U.K., 22.7.27).— See B.P. 298,705 ; B., 1929, 14.

Feed apparatus for machines for depulping fibrecontaining leaves. I. G. FARBENIND. A.-G. (B.P. 319,653, 11.6.29. Ger., 25.9.28).

Twisting of rayon threads. H. WADE. From DU PONT RAYON Co. (B.P. 326,130, 3.10.28).

Continuous machines for making paper and other sheet material from pulp. Societa Invenzioni Brevetti Anonima (B.P. 315,690, 18.4.29. It., 16.7.28).

Fourdrinier papermaking machines. S. MILNE (B.P. 326,330, 27.2.29).

Evaporation of sulphite lye (B.P. 300,590).—See I. Caustic liquor (U.S.P. 1,742,220).—See VII. Artificial timber (U.S.P. 1,742,410).—See IX.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Fast dyeing of cotton and wool. J. V. CROSSLEY (J. Soc. Dyers and Col., 1930, 46, 74-76).—Reference is made to recent additions to the range of anthraquinone vat dyes for fast dyeings on cotton piece and yarn. The Indigosol and Soledon dyes, azoic colours of the Naphthol AS range, and the sulphur colours, Indocarbon CL and CLG, are also mentioned. The dyeing of wool with vat dyes and vat "grains" (ready reduced colours) is described. The superior handle, strength, elasticity, and felting properties compared with those of wool dyed with alizarin dyes and afterchromed at the boil are discussed. N. CHAPPELL.

Formation of crystalline metallic antimony in antimony fluoride bath used for fixing basic dyes on printed fabric. A. SCHERRER (Bull. Soc. Ind. Mulhouse, 1929, 95, 746-747).-In the production of an "imitation Jacquard" fabric obtained by padding fabric with tannic acid, printing with a resist paste containing caustic soda, steaming, passing through a fixing bath of antimony fluoride, and then dyeing with a basic dye, a deposit of about 175 g. of crystalline metallic antimony was observed in the fixing bath. The formation of this is attributed to the reducing action of caustic soda and tannic acid (introduced by the fabric into the fixing bath) on antimony oxide present in the fixing bath, as a result of insufficient acid being added to neutralise the alkalinity of the fabric. A. J. HALL.

Printing with basic dyes without after-treating with tartar emetic. N. LYHRA (Sealed Note No. 1949, 15.11.09. Bull. Soc. Ind. Mulhouse, 1929, 95. 754-755). Report by P. SEYDER (Ibid., 755-756).-A printing paste is used containing the basic dye, tannic acid, and water-insoluble antimony borate ; the dyeantimony tannate lake only forms during the subsequent steaming. E.g., fabric is printed with a paste consisting of 20 g. of basic dye, 60 g. of acetic acid ($d \ 1.045$), 690 g. of a 50% solution of gum Senegal, 10 g. of ammonium chloride (or 20 g. of potassium thiocyanate), 120 g. of a 50% solution of tannic acid (acidified with acetic acid), and 100 g. of antimony paste A, then steamed for 45 min., soaped for 8-10 min. at 40-45°, rinsed, and dried. Paste A is prepared by mixing 200 g. of antimony fluoride, 20 g. of caustic soda $(d \ 1 \cdot 24)$, 120 g. of borax, and 500 g. of water, filtering, pressing the resulting precipitate of antimony borate until it contains 50% of water, and then mixing with its own weight of glycerin. The resulting printed colour effects have the usual fastness to light, soap, and chlorine. SEYDER confirms the efficiency of the process and finds that purer blue shades are obtained with Methylene Blue than when the usual printing process is used. The use of ammonium chloride appears to be unnecessary. A. J. HALL.

[Printing] reserves under Aniline Black on wool. C. and P. SCHWARTZ (Sealed Note No. 1700, 31.1.07. Bull. Soc. Ind. Mulhouse, 1929, 95, 747-749). Report by A. LAU (Ibid., 750-752) .- White and coloured reserves are obtained on previously scoured and chlored wool fabrics by first padding with a solution containing 0.25 g. of ammonium vanadate per litre, drying in the hot flue, printing with a reserve paste containing potassium sulphite (the reserve agent), with or without a dye not affected by the sulphite (e.g., Eosine, Formyl Violet, Auramine, and Guinea Green), then overprinted with an Aniline Black liquor containing a mixture of aniline and p-aminodiphenylamine (either of these amines alone is unsuitable), steamed for 5-6 min. at 102°, then washed and dried. Coloured discharges on a coloured ground may be obtained simultaneously by adding sodium hyposulphite to the reserve paste. Lau reports favourably on the process, although he finds that the resulting black has a brownish tone and that it yields a good black on wool chlored with but 12% of active chlorine, whereas by means of the usual prussiate-Aniline Black process an equal shade could only be obtained after chloring with 25% of A. J. HALL. chlorine.

Printing with indigoid dyes. A. DONDAIN and A. STIEGLER (Sealed Note No. 2082, 3.4.11. Bull. Soc. Ind. Mulhouse, 1929, 95, 757—758). Report by L. DISERENS (*Ibid.*, 758—760).—A more complete and regular fixation of indigo and Hydron Blue R and G in the usual printing process is obtained by replacing hyposulphite-formaldehyde by hyposulphite-acetaldehyde. DISERENS reports that hyposulphite-acetaldehyde is less stable than the corresponding formaldehyde compound, and that under unfavourable conditions of steaming the first-named substance may thus give superior results; otherwise the use of hyposulphiteacetaldehyde has little practical interest. A. J. HALL.

415

CL. VII.-ACIDS; ALKALIS; SALTS; NON-METALLIO ELEMENTS.

Discharges on indigo, thioindigo, and sulphur colours [in printing]. E. LUSTIG and L. PAULUS (Sealed Note No. 1710, 21.2.07. Bull. Soc. Ind. Mulhouse, 1929, 95, 752-753). Report by H. WAGNER (Ibid., 753-754).-In discharging by means of a hyposulphite a purer white is obtained by adding glucose to the discharge paste ; the glucose retards re-oxidation of the reduced dye by exposure to air, so that the dye can be more completely removed. E.g., fabric dyed with indigo or other similar dye is printed with a discharge paste consisting of 30 g. of Hydrosulphite C, 160 g. of a 33% solution of gum, and 10 g. of glucose, steamed for 3 min. at 100° in a small Mather-Platt, passed through a bath containing 50 g. of caustic soda $(d \ 1.38)$ per litre, mangled, acidified, and washed. A somewhat inferior white discharge can also be obtained by omitting the Hydrosulphite C from the discharge paste and passing the printed fabric through a boiling bath of caustic soda. Glucose may also be replaced by other reducing substances such as tannic acid. WAGNER reports that the process gives good results with indigo but not with sulphur dyes. The introduction of Leucotrope W for the same purpose, as described in 1909, provides an alternative method. A. J. HALL.

Esterified cotton. WOODHEAD.-See V.

PATENTS.

Dyeing of mixed fabrics containing acetate silk and the manufacture of dye products suitable therefor. I. G. FARBENIND. A.-G. (B.P. 299,787, 30.10.28. Ger., 31.10.27).-Mixed acetate silk fabrics are dyed with a preparation containing a dye for the wool or cotton and a diazotisable amine having affinity for acetate silk. together with a wetting agent of the alkylnaphthalenesulphonic acid type. The mixture dissolves in hot water without residue. Examples are : Zambesi black D, a-naphthylamine, and sodium butylnaphthalenesulphonate on wool-acetate silk fabric, diazotised and developed with 2:3-hydroxynaphthoic acid for deep black ; Diamine black BH, dianisidine, and the wetting agent on cotton-acetate silk, diazotised and developed as before for dark blue. C. HOLLINS.

Production of coloured patterns on textiles, paper, or plastic masses. I. G. FARBENIND. A.-G., Assees. of E. FRANZ (G.P. 455,808, 31.1.26).—The material is treated evenly or in parts with a colourproducing preparation, *e.g.*, one of the Rapid-fast colours and/or the sulphuric ester of a leuco-vat dye together with ammonium vanadate and sodium chlorate, and is then passed over a hot cylinder on which the pattern is marked. The colour is developed only where the damp material comes into contact with the hot roller, the remainder being white after washing.

C. HOLLINS.

Printing and dyeing. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 324,315, 16.8.28).—Alkalimetal compounds of hydroxylated alkyl- or cycloalkylamines, with or without an organic solvent, are incorporated with vat dyes or sulphide dyes in printing pastes not containing hyposulphite or other strong reducing agent; or are added to such dyes before or during the dyeing operation. Indanthrene blue GC with 1.5 pts. of di(hydroxypropyl)amine and thickener (6.5 pts.) gives clear, bright prints. Indanthrene Yellow G is dyed from a bath containing caustic alkali, dextrose, and "triethanolamine." cycloHexyl- β -hydroxyethyl-amine is also mentioned. C. HOLLINS.

Printing with vat dyes. I. G. FARBENIND. A.-G. (B.P. 304,787, 25.1.29. Ger., 26.1.28. Addn. to B.P. 279,864; B., 1929, 15).—The fabric is printed with vat dye and a cellulose ether (*e.g.*, the methyl ether) and is passed through an alkaline hyposulphite bath. The cellulose ether is thus precipitated and the dye does not bleed even if the fabric is not dried before steaming. C. HOLLINS.

Treatment of textiles [Chloroamine-T as assistant]. CHEM. FABR. VON HEYDEN A.-G. (F.P. 610,985, 11.2.26).—Sodium *p*-toluenesulphonchloroamide is used with starch for sizing, with glycerin and tartaric or citric acid for silk finishing, alone for de-sizing, or with alkali for boiling-out. Wool treated with the chloroamide and hydrochloric acid and washed with bisulphite shows increased affinity for dyes. The chloroamide may also be added to wool-scouring baths.

C. HOLLINS.

Protection of wool, fur, hair, feathers, etc. against attack by moth. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 324,962, 5.10.28).—The materials are treated with arylsulphonarylamides. Amongst the 50 examples are p-chlorophenol-2:6disulphondi-p-chloroanilide, NN'-bis-2:4:5-trichlorobenzenesulphonyl-m-phenylenediamine, and 2:4:5trichlorobenzenesulphon-p-chloro-m-valeramidoanilide. The necessary sulphonyl chlorides are obtained by the chlorosulphonic acid method. C. HOLLINS.

Bleaching process. G. ADOLPH and A. PIETZSCH (U.S.P. 1,750,657, 18.3.30. Appl., 11.3.27. Ger., 29.3.26).--See B.P. 268,325; B., 1928, 155.

Propellers or screws employed in dyeing machines. E. and L. CONSTANT (Soc. E. & L. CONSTANT) (B.P. 302,186, 10.12.28. Fr., 10.12.27).

Condensation products (B.P. 321,190).—See III. Artificial silk (B.P. 311,391 and 325,246).—See V.

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

Improvements in the manufacture of chamber sulphuric acid with gases rich in nitrogen oxides. R. MORITZ (Oesterr. Chem.-Ztg., 1930, 33, 42).—The Gay-Lussac towers are fed with acid of $d \cdot 753$ — $1 \cdot 797$. To overcome the trouble incidental to the use of acid of this concentration, a cooling and drying apparatus, utilising the acid from the second Gay-Lussac tower, is inserted between the chambers and the first tower, thus cooling and drying the gases entering this tower. A marked economy is effected. W. J. WRIGHT.

Comparative economies of coke and electric furnaces [for electrothermal production of phosphoric acid]. A. KOCHS (Chem. Met. Eng., 1929, 36, 741-742). B. G. KLUGH (*Ibid.*, 1930, 37, 105-106). --Klugh's figure (cf. B., 1930, 55) of 3.085 lb. of carbon per lb. of phosphorus pentoxide as the energy requirement of the coke process is queried. Assuming that coke contains 90% C, the heat produced by its oxidation to carbon monoxide is likely to be cheaper than the equivalent heat produced electrically. Further, a considerable proportion of the heat of combination of the carbon monoxide leaving the blast furnace is capable of recovery.

KLUGH states that the figure in question is based on the heat of combustion of carbon to carbon monoxide, a thermal efficiency of $62 \cdot 8\%$, and a recovery of 80% of pentoxide. The efficiency figure is that of standard blast-furnace practice. The preheating of the blast to 500° by the combustion of carbon monoxide is allowed for, and no other form of heat exchange is likely to be practicable. Further, the power requirements of a blast furnace are considerable. The electric furnace offers greater possibilities of ultimate economies.

C. IRWIN.

Iodometric analysis of a mixture of hyposulphite, sulphite, and thiosulphate. R. WOLLAK (Z. anal. Chem., 1930, 80, 1-4).—The method used involves three iodine titrations. Hyposulphite and thiosulphate are first determined in a portion of the sample by Bacha's method (A., 1922, ii, 311); a second portion is dissolved in an excess of iodine solution containing sodium acetate. The excess of iodine is removed with 0.4N-sodium sulphite, and an additional 30 c.c. of this solution are added. The liquid after being neutralised with N-sodium hydroxide and kept for 5 min. behaves according to the following reaction: $Na_2S_4O_6 + Na_2SO_3 = Na_2S_3O_6 +$ $Na_2S_2O_3$. On adding 5 c.c. of formalin to combine with the excess of sulphite, acidifying the solution with acetic acid, and titrating with iodine, the amount of this required corresponds to half the thiosulphate initially present in the sample. The total iodine required by a third portion of substance is then found, and the amount of sulphite present found by difference.

H. F. HARWOOD.

Manufacture of a new form of chloride of lime. A. CARUGHI and C. PAOLONI (Giorn. Chim. Ind. Appl., 1930, 12, 9—13).—By the action of chlorine on lime suspended in carbon tetrachloride a new form of bleaching powder is obtained with an available chlorine content of 38-40%. By varying the conditions of preparation it may be obtained in the crystalline or amorphous form. The crystalline anhydrous form is the more stable, and can be kept for a long period without decomposing even at 50-80°. It has no smell of chlorine, is easily soluble in water, and is denser and less hygroscopic than ordinary bleaching powder. O. J. WALKER.

Chlorometric, bromometric, and iodometric determination of available chlorine in hypochlorite solutions and bleaching powder. II. H. DITZ and R. MAY (Z. anal. Chem., 1930, 79, 371-388; cf. A., 1930, 310).—Modifications of Penot's method (titration with arsenite) have been examined and compared with Rupp's iodometric method. The former all give lower results than the latter with the exception of Mohr's modification (addition of excess of arsenite followed by back-titration with iodine solution), the results from which agree satisfactorily with those obtained in the iodometric process. Experiments showed that the presence of calcium hydroxide has no influence on the reaction between the arsenite and the iodine, as the sodium hydrogen carbonate present in the former solution reacts with the dissolved lime to form insoluble calcium carbonate. The Penot-Mohr method may also be employed to determine the available chlorine in alkali hypochlorite solutions, provided that 10 c.c. of a 10% solution of calcium chloride be added 5 min. before the back-titration with iodine. Kolthoff's method of titration, using the hypochlorite solution in the burette, gives results which are both too high and discordant. H. F. HARWOOD.

Determination of chlorides in salt brines. S. L. NEAVE (Ind. Eng. Chem. [Anal.], 1930, 2, 28).-In the analysis of brines it is necessary that the chlorine content should be determined as accurately as possible, as owing to the great preponderance of sodium and chlorine ions in these liquids small errors in their determination seriously affect the calculation of the hypothetical combinations of the other ions present. The following method is recommended as affording the requisite accuracy without excessive expenditure of time. suitable volume of the brine is precipitated with an excess of 0.1N-silver nitrate, the silver chloride is filtered off and weighed, and the filtrate titrated with 0.1N-potassium thiocyanate. The chlorine present is then taken from the mean of the gravimetric and volumetric results, which are subject to errors of opposite sign. Test analyses showed that the figure so obtained was very close to the true value for the chlorine actually H. F. HARWOOD. present.

Preparation of potassium dichromate from Solikamsk sylvite. V. S. YATLOV (J. Appl. Chem., Russia, 1929, 2, 561–568).—The material is used for interaction with sodium dichromate. The purity of the product is 98·32%. CHEMICAL ABSTRACTS.

Experimental production of ammonium molybdate. A. S. GARNAK (J. Chem. Ind., Russia, 1929, 6, 534-535).-Ferromolybdenum (65 kg.) is heated at 600° in a 10-cm. layer, being stirred every 20-30 min.; after 2.5-3 hrs. the reaction becomes slower and the temperature is finally raised to 750-790°. The mixture then contains 55-65% MoO3. The roasted material (105 kg.) is mixed with water (120 litres) and 25% alcoholic ammonia solution (45 kg.) in an iron ball-mill; the product is filter-pressed, and the solution, $d \ 1 \cdot 22$, is treated with ammonium sulphide (4 litres for 500 litres) to remove iron and heavy metals. The excess of ammonium sulphide is removed with lead nitrate solution. Before crystallisation, nitric acid is removed with sulphur dioxide. CHEMICAL ABSTRACTS.

Perchloric acid as oxidising agent in the determination of chromium [in chrome alum liquors and crystals]. J. J. LICHTIN (Ind. Eng. Chem. [Anal.], 1930, 2, 126—127).—The chromium salt (0.2-1 g.) is heated in a flask with 5 c.c. each of water and 60% perchloric acid until oxidation is complete. After cooling, 40—50 c.c. of water are added and the remaining chlorine is expelled by boiling. Ammonia is added and any hydroxides of iron and aluminium are removed by filtration, the chromate in the filtrate being determined iodometrically. The method is rapid and accurate and affords a good separation of chromium from iron and aluminium. H. F. HARWOOD.

Synthetic ammonia from soil. WINOGRADSKY.— See XVI.

PATENTS.

Manufacture of phosphoric acid and hydrogen. J. Y. JOHNSON. From I. G. FARBENIND A.-G. (B.P. 325,533, 16.11.28).—Water or steam is allowed to react with phosphorus at elevated temperatures (650—700°) and the product is oxidised almost wholly to phosphoric acid without addition of oxygen by slightly reducing the temperature (to 600°), *e.g.*, by addition of water or steam, preferably in the presence of catalysts (coppernickel alloys, carborundum, carbon, etc.), and maintaining this reduced temperature for some time.

S. K. TWEEDY.

Decolorisation of caustic liquors. G. A. RICHTER, Assr. to BROWN CO. (U.S.P. 1,742,220, 7.1.30. Appl., 13.2.28).—The colloidal colour impurities are adsorbed by fibrous α -cellulose, *e.g.*, by mixing the liquor with 1% by wt. of fibre. The adsorptive surface of the fibre may be enlarged by beating. S. K. TWEEDY.

Process and apparatus for operating with ammonia. J. Y. JOHNSON. From I. G. FARBENIND, A.-G. (B.P. 325,557, 15.9.28).—Those parts of apparatus coming in contact with ammonia at temperatures exceeding 600° are constructed of, or lined with, silicon or substances containing uncombined silicon. The silicon may be applied as a cement with a binding medium such as water-glass. Silicon alloys, *e.g.*, with copper, may be used provided the amount of the metal constituents capable of decomposing ammonia does not exceed the limits at which their decomposing action would become apparent to an undesirable extent.

S. K. TWEEDY.

Manufacture of alkali formates and ammonia from carbon-containing alkali cyanide. FABR. DE PROD. CHIM. DE THANN ET DE MULHOUSE (F.P. 630,686, 7.6.26).—Cyanide made according to B.P. 225,160 (B., 1928, 98) is hydrolysed at $230-270^{\circ}$ and gives a dry powder containing sodium formate (22°_{0}) , sodium hydroxide $(3-4^{\circ}_{0})$, lime (55°_{0}) , and carbon $(15-20^{\circ}_{0})$. The aqueous extract is made feebly acid with sulphuric or formic acid, and evaporated to give alkali formate.

C. HOLLINS.

Manufacture of alkaline-earth cyanamides. J. GUILLISSEN, and UNION CHIM. BELGE, SOC. ANON. (B.P. 326,117, 5.7.29).—Calcium carbonate is treated with ammonia mixed with carbon dioxide in proportion such that the partial pressure of the latter gas is at least equal to the dissociation pressure of the carbonate at the temperature employed, *e.g.*, working at 900°, a mixture of equal vols. of the gases is used. L. A. COLES.

Production of basic aluminium sulphate. C. C. FEAGLEY, ASST. to GRASSELLI CHEM. Co. (U.S.P. 1,742,345, 7.1.30. Appl., 25.6.25).—Heavy hydrated alumina, substantially free from insoluble matter, is added to sulphuric acid (e.g., 35% solution) in a quantity which exceeds by about 10-20% that theoretically required to form the normal sulphate, and the solution is evaporated. Alumina originally containing iron when so treated will give a commercially iron-free product.

S. K. TWEEDY.

Crystallisation of salts. P. H. MÜLLER (B.P. 325,650, 2.1.29).—Solutions containing, e.g., sodium carbonate or sulphate are concentrated in a series of vacuum vessels operated under successively decreasing pressures and temperatures and provided at the top with coolers and means for withdrawing condensed vapour, the solutions being preheated before entry into the first vessel by passing in the reverse direction through coils situated in the vapour spaces of the vessels. The liquor leaving the last vessel passes into a crystallising vessel working under a still higher vacuum and provided at the lower end with means for passing the magma into a centrifugal separator or filter, and at the upper end with a cooling coil serving as the vaporiser of a refrigerator.

L. A. Coles.

Manufacture of crystalline materials. H. O. DERING (B.P. 325,757, 13.5.29).—Crystals capable of rapid dissolution are obtained by agitating and/or seeding supersaturated solutions prepared by the slow cooling of quiescent, concentrated solutions in vessels having a smooth inner surface and under conditions such that superficial evaporation is prevented.

L. A. Coles.

Production of titanium [di]oxide. F. von BICHOW-SKY, Assr. to TITANIA CORP. (U.S.P. 1,742,674, 7.1.30. Appl., 15.6.27).—Titanium nitride prepared as previously described (cf. U.S.P. 1,408,661; B., 1922, 294 Å) is treated with dilute nitric acid: $5\text{Ti}_2\text{N}_2 + 8\text{HNO}_3 = 10\text{TiO}_2 + 4\text{H}_2\text{O} + 9\text{N}_2$. Alternatively, the nitride may be heated with concentrated sulphuric acid containing a metal (sodium) nitrate or nitric acid; the cooled solution is then poured into cold water, when all the titanium enters solution as sulphate and is precipitated as pure oxide on boiling. Any iron present must be kept in solution by having hydrochloric acid, chlorine, or sulphuric acid present. The oxide obtained is finely divided and suitable for pigments. A method of directly obtaining a titania-barytes paint base is described.

S. K. TWEEDY.

Preparation of hydrogen and absorption of carbon dioxide from gas mixtures. F. GÜLKER (B.P. 301,499, 21.11.28. Ger., 1.12.27. Addn. to B.P. 275,273; B., 1929, 95).—The absorbent and catalytic material used in a modification of the prior process comprises approximately equimolecular proportions of calcium and magnesium oxides, obtained by calcining dolomite; other catalysts may also be added.

L. A. Coles.

Apparatus for solidifying [molten] sulphur. I. E. HANSON and J. B. GAFFNEY (U.S.P. 1,742,391, 7.1.30. Appl., 11.6.27. Renewed 30.10.29).—For this purpose a large aluminium tray of smooth interior surface is rotatably mounted and has an open side temporarily closed. On removing the closure, the tray automatically tips downwards and the cake, 6 in. thick, slides out. S. K. TWEEDY. Purification of impure titanium dioxide. DEUTS. GASGLÜHLICHT-AUER-GES.M.B.H. (B.P. 309,598, 10.4.29. Ger., 14.4.28).—The dioxide is freed from contaminating chromium oxide by mixing with a small excess of alkali or alkaline earth (magnesia, alkali carbonate, etc.), drying, roasting at incandescent heat, and lixiviating out the soluble chromate with water or dilute acid. Oxidising agents may be added to accelerate the formation of chromate. S. K. TWEEDY.

Manufacture of nitrous oxide from ammonia. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 325,475, 12.11.28 and 25.7.29).—Ammonia mixed preferably with excess of oxygen, or gases containing oxygen, is passed over a catalyst (*e.g.*, platinum, iron oxide containing bismuth oxide or manganese oxide, etc.) at 200—500° at a suitable speed such that the product is substantially free from nitric and higher oxide, but the nitrous oxide formed is not decomposed (*e.g.*, 1000 litres/hr. per litre volume of the catalyst). S. K. TWEEDY.

Recovering nitric acid from weak nitric liquors. H. HIRTZ (U.S.P. 1,752,086, 25.3.30. Appl., 23.2.24. Ger., 15.6.23).—See B.P. 217,546 ; B., 1925, 98.

Production of hydrocyanic acid. F. LINDER and F. LINK, Assrs. to I. G. FARBENIND. A.-G. (U.S.P. 1,751,933, 25.3.30. Appl., 18.10.27. Ger., 30.10.26).— See B.P. 300,369; B., 1929, 52.

Manufacture of active silica. F. STOEWENER, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,751,955, 25.3.30. Appl., 16.7.26. Ger., 23.7.25).—See B.P. 255,864; B., 1928, 230.

Synthetically producing ammonia from its elements. G. F. UHDE (U.S.P. 1,750,551, 11.3.30. Appl., 30.6.27. Ger., 2.7.26).—See B.P. 273,735; B., 1929, 52.

[Manufacture of] salts of alkaline-earth metals. F. LINDER, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,751,932, 25.3.30. Appl., 25.4.27. Ger., 8.6.26).— See B.P. 289,196 ; B., 1928, 447.

Manufacture of anhydrous magnesium chloride. K. STAIB, Assr. to I. G. FARBENIND. A.-G. (U.S.P. 1,749,854, 11.3.30. Appl., 6.5.26. Ger., 9.5.25).—See B.P. 259,498; B., 1926, 979.

Production of lead [mon]oxide in a state of high dispersion. L. SCHERTEL and W. LÜTY, Assrs. to T. GOLDSCHMIDT A.-G. (U.S.P. 1,749,781, 11.3.30. Appl., 4.2.25. Ger., 8.2.24).—See B.P. 228,900; B., 1925, 847.

Apparatus for production of hydrogen. F. E. LEFEBVRE, ASST. to OXYHYDRIQUE FRANÇ. (U.S.P. 1,752,187, 25.3.30. Appl., 16.7.28. Fr., 18.7.27).—See 294,150; B., 1929, 814.

Washing of granular material (U.S.P. 1,741,063). Evaporation of sulphite lye (B.P. 300,590).—See I. Treatment of minerals (U.S.P. 1,742,191).—See X. Products by gaseous discharge (B.P. 300,282).—See XI. Fertilisers (U.S.P. 1,742,448; B.P. 306,103 and 300,965).—See XVI.

VIII.—GLASS; CERAMICS.

Thermal expansion of Jena glass 16 III. W. H. KEESOM and A. BIJL (Proc. K. Akad. Wetensch. Amsterdam, 1929, 32, 1164—1166).—With a slightly modified form of the method used by van Agt and Onnes (cf. A., 1926, 231), measurements of the linear thermal expansion were made at 100°, -103° , -183° , and -253° . The value found for the coefficient of cubical expansion between 0° and 100° was $237 \cdot 5 \times 10^{-7}$, in fair agreement with the results of the former workers. The coefficient of cubical expansion when remeasured by the weightthermometer method gave the value $242 \cdot 1 \times 10^{-7}$, in good agreement with Jansen's result. N. M. BLIGH.

PATENTS.

[Electric] tunnel or enamelling pottery kilns. ELECTRIC FURNACE CO., LTD., and W. J. MILLAR (B.P. 325,794, 21.11.28).—The heating coils, wound in longitudinal grooves in the brickwork lining of the kiln, can be connected independently to the source of current, so that the vertical temperature gradient can be regulated, and are of varying lengths, so that any required distribution of heat can be obtained along the kiln. The brickwork of the roof and side walls is recessed at intervals to prevent draughts when the end doors are opened, and air-inlet dampers and outlets are provided to allow of the escape of oily fumes etc. L. A. COLES.

Removal of impurities [iron compounds] from sand and like materials. CHANCE BROS. & CO., LITD., and J. ENGLISH (B.P. 325,386, 12.2.29).—Ferruginous sand and other silicious materials are rendered suitable for use in the manufacture of glass and of pottery etc., respectively, by successive or simultaneous treatment at 700—1000° in a rotary kiln with reducing gases (e.g., carbon monoxide, sulphur dioxide, or, in the case of successive treatment, hydrogen) and with chlorine, after which the iron chloride formed is removed.

L. A. Coles.

Manufacture of decorative glass. H. D. MURRAY and D. A. SPENCER (B.P. 325,924, 24.12.28).—The gelatin coatings on glass sheets for use in the manufacture of composite glass are given a coloured design by the use of diazo compounds. L. A. COLES.

Manufacture of porous [ceramic] objects. A. J. MANDELL (U.S.P. 1,742,515, 7.1.30. Appl., 8.10.24. Renewed 9.4.29).—The clay is mixed with particles of a solid substance that will volatilise below its m.p. and below the fritting point of the clay. Among substances that can be used, naphthalene and anthracene are more satisfactory than ammonium chloride because the former are non-miscible with the water that is also used. By using different mixes for different parts of the same object different degrees of porosity may be obtained ; e.g., bricks with a non-conducting porous back and a compact slag-resisting face may be made with only one firing. The volatile substance is removed during the ordinary drying process or a continuation thereof at a B. M. VENABLES. slightly increased temperature.

Preparation of refractory linings or crucibles for coreless electrical induction furnaces. N. R. DAVIS, and ASSOC. ELECTRICAL INDUSTRIES, LTD.

aa

(B.P. 325,661, 8.1.29).—Crucibles made of refractory material capable of being sintered are provided at or within the mouth with a metal ring of thickness such that it is not melted by the eddy currents set up when the inductor is energised; when the initial charge is poured, it melts a portion of the ring near the spout, thus providing a gap for pouring out subsequent charges.

L. A. Coles.

Continuous kiln. C. B. WINZER (U.S.P. 1,749,866, 11.3.30. Appl., 28.3.29. U.K., 8.3.28).—See B.P. 318,650; B., 1929, 919.

Production of [tinted violet] glass. B. Long, Assr. to Soc. Anon. des Manuf. des Glaces & Prod. Chim. de St.-Gobain, Chauny, & Cirey (U.S.P. 1,749,823, 11.3.30. Appl., 14.6.28. Fr., 2.7.27).—See B.P. 293,310; B., 1928, 711.

Manufacture of ceramic ware. J. W. MELLOR (U.S.P. 1,749,642, 4.3.30. Appl., 2.10.28. U.K., 31.1.28).—See B.P. 302,519; B., 1929, 130.

Manufacture of ceramic materials, building elements, etc. from mud. A. LOESSIN (U.S.P. 1,751,163, 18.3.30. Appl., 20.9.26. Ger., 1.10.25).— See B.P. 259,236 ; B., 1927, 332.

Composition and manufacture of refractory basic brick and the like. C. S. GARNETT (U.S.P. 1,751,234, 18.3.30. Appl., 6.3.23. U.K., 18.3.22).— See B.P. 197,791 ; B., 1923, 721 A.

Manufacture of plate and sheet glass. C. HEUZE (B.P. 307,302, 4.3.29. Belg., 3.3.28).

[Glass] furnace (U.S.P. 1,739,973). Porous body for diffusion etc. (U.S.P. 1,742,411).—See I.

IX.—BUILDING MATERIALS.

Silication of limestone for road surfaces. S. MANTEL (Przemysl Chem., 1930, 14, 132-141).-The silication of limestone depends not on chemical combination to yield calcium silicate, but on the separation of silica in the pores of the limestone as a result of hydrolytic reactions. The mechanical resistance of calcium carbonate briquettes is greatly increased by treating with sodium silicate solutions, the best results being obtained with briquettes of a porosity of 12-17%. The chemical composition of the silicate solution used has no apparent influence on the results within the limits taken $(SiO_2: Na_2O = 2 \cdot 6 - 4 \cdot 0)$. The increase in mechanical resistance following on silication is directly proportional to the quantity of silica introduced into the given material; limestones of relatively lower porosity should therefore be treated with more concentrated solutions of sodium silicate. R. TRUSZKOWSKI.

PATENTS.

Shaft kiln for calcining cement or lime. E. MEIER (G.P. 460,846, 11.5.26. Addn. to G.P. 445,554; B., 1928, 194. Cf. G.P. 449,789; B., 1928, 896).—A chamber with completely free cross-section is interposed before the combustion zone to serve as a preheating and de-acidifying chamber. It is heated only by radiation from the combustion zone. Baffles project from the side walls and from a central wall below the combustion zone in order to retard the free fall of the material.

A. B. MANNING.

Manufacture of waterproof composition for Portland cement. H. HAMAKADO (B.P. 325,991, 14.2.29).—Aluminium hydroxide, precipitated by treating aluminium sulphate etc. with sodium carbonate or bicarbonate, is washed free from sulphate, carbonate, etc. by decantation and heated with a soluble soap to yield a homogeneous emulsion which is boiled and, after the addition of boric acid, diluted with water. The product, after further dilution with water, is used for the mixing of Portland cement. L. A. COLES.

Water-resistant composition of matter [for use in building]. O. W. STOREY and M. KLIEFOTH, Assrs. to C. F. BURGESS LABS., INC. (U.S.P. 1,742,794, 7.1.30. Appl., 1.4.27).—An intimate mixture of limestone of average particle size $8\cdot4$ —11 $\cdot0\mu$ with sodium silicate solution of viscosity not less than 2000 centipoises at 25° and containing 0.38—0.17 pt. of sodium silicate per 1 pt. of filler, is heated at about 210°. L. A. COLES.

Colouring [and glazing] of granular slate and the like. H. C. FISHER, ASST. to PHILIP CAREY MANUF. Co. (U.S.P. 1,742,440, 7.1.30. Appl., 13.4.25).—The material is successively treated with a solution containing lead acetate and borax, mixed with sodium silicate (and then with, *e.g.*, iron sulphate, chromic oxide, copper sulphate if a coloured product is required), heated at about 1000° until it begins to coalesce, and cooled in the air. L. A. COLES.

Cementitious compositions for manufacture of articles impervious to fluids. J. A. GREENE, and BINDPHAST PRODUCTS, LTD. (B.P. 325,255, 18.10.28).— The use is claimed of mixtures of sawdust, powdered leather, marble, sand, coal, etc. (100 pts.) with a binder consisting of 12.5 pts. of magnesium chloride and 35 pts. of calcined dolomite rendered plastic by the addition of dilute hydrochloric acid or chlorine solution ; hardening agents, e.g., sodium silicate, zinc oxide, alum, or solutions of dextrin or celluloid in amyl acetate may also be added. L. A. COLES.

Manufacture of flexible floor, wall, and like coverings. P. C. VAN DER WILLIGEN, and N.V. NEDER-LANDSCHE LINOLEUMFABR. (B.P. 301,901, 22.11.28. Holl., 8.12.27).—The constituents of the material, *e.g.*, oils or their oxidation or polymerisation products, or rubber latex, or asphaltic material, together with fillers, colouring material, vulcanisers, accelerators, anti-agers, etc. are mixed in the form of aqueous colloidal solutions or suspensions, and the colloidal material is coagulated, separated from the water, and worked up in the usual manner. L. A. COLES.

Manufacture of coverings for floors, walls, etc. H. BÖRNSTEIN, and N.V. NEDERLANDSCHE LINOLEUM-FABR. (B.P. 306,140, 12.2.29. Holl., 17.2.28).—Mixtures of cellulose benzoate plasticised, *e.g.*, with tolyl phosphate, fillers, colouring material, and, if desired, oxidation products of drying oils are pressed hot into flat layers; a jute foundation may also be used.

L. A. COLES.

Manufacture of artificial timber and the like. A. E. MILLINGTON, ASST. of FIR-TEX INSULATING BOARD Co. (U.S.P. 1,742,410, 7.1.30. Appl., 26.5.27).—Fibrous wood stock etc., prepared as described in U.S.P. 1,708,586 (B., 1929, 554), is successively compressed to extract the water, loosened to a fluffy condition, impregnated with hot coal-tar creosote oil, and re-compressed in an unheated press to expel excess oil; the product may be strengthened by further compression with the application of heat. L. A. COLES.

Preparation of oxychloride cement. J. U. A. OHLSEN (U.S.P. 1,752,194, 25.3.30. Appl., 12.11.24. Denm., 13.11.23).—See B.P. 236,827; B., 1925, 720.

Manufacture of bituminous concrete. L. S. VAN WESTRUM, ASST. to BITUCRETE, LTD. (U.S.P. 1,752,214, 25.3.30. Appl., 16.5.27. U.K., 31.5.26).—See B.P. 275,364; B., 1927, 780.

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

Decarburisation of carbon-iron alloys. L. HACK-SPILL and E. SCHWARZ (Ann. Chim., 1930, [x], 13, 1-39). -At 1000° the chlorides and carbonates of the alkali and alkaline-earth metals effect superficial decarbonisation of cast iron and steel; in 2-3 hrs. the carbon is almost completely removed from hypoeutectoidal steels to a depth of about 1 mm. It is suggested that the active agent in this reaction is the alkali or alkaline-earth metal liberated from its salt by the iron. Calcium rapidly removes carbon and phosphorus almost completely from cast iron 1-2 mm. thick at 1000°, forming calcium carbide and phosphide. Lithium behaves similarly above 450°, but sodium and potassium above 800° act much more slowly as the carbides formed are relatively unstable at the ordinary pressure. Sodium carbide has been made by direct union of the elements under pressure at 1100°. A new and efficient form of Töpler vacuum pump is described and illustrated.

A. R. POWELL.

Jackhammer drill steel. G. R. HEYWOOD (Third Empire Min. Met. Congr., Apr., 1930, 23 pp.).—The paper contains a record of numerous life tests carried out on various drill steels of different origin and of different shapes and dimensions. It is concluded that the life of the steel is prolonged by smoothness of bore and by the use of an unforged shank; welding shortens the life of the jumper considerably. A. R. POWELL.

Cause of quenching deformation in tool steels. D. HATTORI (Sci. Rep. Tôhoku, 1929, 18, 665-698).-Experiments on the deformation produced by quenching prisms and cylinders of varying dimensions made of different kinds of steel are described. The causes of the deformation are the structural change and especially the thermal stress produced by unequal cooling of different parts of the specimen. The expansion due to structural change is produced in the steel specimen after it has been permanently deformed by thermal stress, and the change in shape is similar to that of a specimen which has been subjected to thermal stress only, except that the dimensions are increased in every direction by structural change. If the rate of cooling is slow this expansion and the thermal contraction occur at nearly the same rate, and the deformation becomes less. The warping of a tool steel is also due to structural change and thermal stress. To minimise the quenching deformation and warping of a tool it should be made of a steel which hardens greatly even if it is cooled slowly, and it should be quenched at the lowest possible rate at which it becomes hard. O. J. WALKER.

Changes in the properties of iron-nitrogen alloys by quenching and annealing below the A1 point. W. Köster (Arch. Eisenhüttenw., 1929-1930, 3, 553-558; Stahl u. Eisen, 1930, 50, 254-255).-The solubility of nitrogen in α -iron decreases from about 0.5% N at the eutectoid temperature, 580°, to 0.015%at 20°, the iron nitride separating during cooling through this range in the form of thin lamellæ. By quenching from just below 580° this separation can be prevented, the resulting brittle iron then undergoing age-hardening at the ordinary temperature; thus iron containing 0.12% N and having a hardness of 105 has a hardness of 190 after quenching from 550°, which increases to 270 in 28 days at the ordinary temperature and decreases to 105 in 1 hr. at 150°. Similar results are obtained with mild steel after nitriding and at the same time the temperature of the A1 transformation is depressed. The coercivity of steel containing nitrogen rises rapidly during the precipitation of the highly dispersed nitride on ageing. Magnetic and electrical resistance measurements indicate that the solubility of nitrogen in iron begins to increase at 100-150°, so that the tendency of the dispersed nitride to coagulate is very small.

A. R. POWELL.

Magnetic alloys of iron, nickel, and cobalt. G. W. ELMEN (J. Franklin Inst., 1929, 207, 583-617). -The results of 15 years' research on the magnetic properties of alloys of iron, nickel, and cobalt are reviewed, and the effect of heat-treatment is discussed. The intrinsic inductions for magnetising forces of 50 and 1500 gauss, the initial and maximum permeabilities, and the hysteresis loss for a maximum flux density of 5000 gauss are given in three-dimensional diagrams. Curves of magnetisation and permeability are also given for certain alloys. Two groups of alloys are of special interest. The iron-nickel alloys (permalloys) containing more than 30% Ni show after slow cooling a high permeability for low flux densities. The alloy containing 78.5% Ni has a maximum permeability of 120,000. A group of ternary alloys which have constant permeability and extremely low hysteresis loss at low flux densities are known as "perminvars." This group includes alloys containing 10-40% Fe, 10-80% Ni, and 10-80% Co, the most constant permeability for different magnetising forces being given by the 45% Ni, 25% Co, 30% Fe alloy.

C. J. SMITHELLS.

Determination of the specific volume of molten iron, nickel, and iron alloys. C. BENEDICKS, N. ERICSSON, and G. ERICSON (Arch. Eisenhüttenw., 1929—1930, 3, 473—486; Stahl u. Eisen, 1930, 50, 332—333).—The d of molten iron at 1600° decreases in a smooth curve with increasing carbon content, the curve resembling the liquidus of the iron-carbon system. The sp. vol. of pure iron at 1600° is 0.1397, of the 1% C alloy 0.1461, and of the 4% C alloy 0.1566. The change of sp. vol. per 100° increases from 0.0020 with pure iron to 0.0038 with the 4% C alloy.

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

Iron-nickel alloys with 26, 36, and 40% Ni undergo a contraction when heated above 1600°, but pure nickel and alloys with 43.3, 60, and 80% Ni behave normally, although all the alloys have a sp. vol. greater than the weighted mean of the constituents, the deviation being greatest with alloys containing 30-40% Ni. These results tend to confirm the assumption that a definite compound Fe2Ni exists. The sp. volumes of molten alloys of iron with aluminium, chromium, manganese, phosphorus, silicon, and tungsten are approximately directly proportional to the composition.

A. R. POWELL.

Corrosion of metals. F. MÜLLER (Z. angew. Chem., 1930, 43, 225-229).-A review of recent theories and experiments. J. A. V. BUTLER.

Particle size as a factor in the corrosion of lead by soils. R. M. BURNS and D. J. SALLEY (Ind. Eng. Chem., 1930, 22, 293-297).-Corrosion of samples of lead buried in ground quartz of increasing particle size, and exposed to moist air at 40° for periods of 195-3601 hrs., was found to increase exponentially with particle size for the first 300 hrs., after which the rates of corrosion for all sizes became constant. Moisture influences the corrosion, which is caused by variations of oxygen concentration at the surface caused by contact with the particles. Similar results were obtained with natural soils. S. I. LEVY.

"White rust " on galvanised ironware. E. H. SCHULZ (Stahl u. Eisen, 1930, 50, 360-362).-The white deposit, having a similar appearance to rust, which forms on galvanised articles during storage in a damp atmosphere, contains zinc oxide, water, and carbon dioxide, and, on addition of water, becomes pasty and gelatinises. Its formation is caused by condensation of water on the surface of the articles and the absorption by this water of carbon dioxide from the air. The composition of the zinc coating has no influence on the production of the deposit. Efficient ventilation of the storage room and the maintenance of an equable temperature prevent the "rusting." A. R. POWELL.

Effects of impurities on copper. VI. Effect of phosphorus on copper. D. HANSON, S. L. ARCHBUTT, and G. W. FORD (Inst. Metals, Mar., 1930. Advance copy. 22 pp.; cf. B., 1927, 280).-In small quantities phosphorus removes oxides from copper (though both phosphorus and oxygen can be present together in copper), and improves both the cold-working properties and the fatigue range without impairing toughness. The presence of phosphorus increases the contraction on cooling and also the hardness of the cast ingots. Ingots containing 0.04% or more of phosphorus have a density approaching that of the corresponding rolled rod, but with more than 0.49% P the cast metal is liable to be unsound, though alloys up to 0.95% P may be hot-worked and further cold-worked after annealing. The limiting value for hot-working lies between 0.95 and 1.2% P. The tenacity of rolled copper is raised by the presence of phosphorus to a greater extent, at 250°, than by oxygen, iron, or arsenic, without any marked decrease in ductility. Ageing treatment did not improve the tensile properties of the alloys studied. C. A. KING.

Gases in copper and their removal. W. E. PRYTHERCH (Inst. Metals, Mar., 1930. Advance copy. 8 pp.).-The marked reduction in the solubility of hydrogen and sulphur dioxide at the temperature of solidification of copper gives rise to unsound ingots (blowholes). The degree of unsoundness is dependent on the temperature of casting, the rate of solidification, and possibly on the size and shape of the ingot. Slow cooling facilitates escape of the occluded gases, which is aided also by passing an inert gas, e.g., nitrogen, into the metal, followed by remelting of the cooled copper. Under gas treatment, ingots had d 8.84 as compared with d 8.50 when cooled under ordinary conditions. Melting in vacuo was also an effective means of reducing dissolved gases, but the indirect oxidation of hydrogen by means of copper oxide with subsequent reduction of the oxidised copper was too slow to be of appreciable service. C. A. KING.

Influence of gases on the soundness of copper ingots. N. P. Allen (Inst. Metals, Mar., 1930. Advance copy. 44 pp.).-The presence of hydrogen in molten copper can cause blowholes on cooling unless cooled sufficiently slowly, cooled under reduced pressure (about 6 cm. Hg), or cooled under the influence of a neutral gas, e.g., nitrogen, carbon dioxide, or carbon monoxide; the presence of arsenic or phosphorus tends to reduce or may even prevent the formation of blowholes, the nature of the reaction remaining unexplained. When oxygen is present in addition to hydrogen the blowholes are smaller, more numerous, and tend to segregate in the parts solidifying last, showing similarity to the unsoundness observed in commercial ingots. Oxygen to the extent of 0.002% is sufficient to give this effect, and unsoundness is considered due to the combined presence of cuprous oxide and hydrogen which may co-exist in equilibrium in molten copper. The removal of the last traces (0.0001%) of hydrogen is difficult, and the required action of deoxidisers consists in combining the oxygen present as an oxide incapable of being reduced by hydrogen, thereby preventing the production of steam during the freezing process. C. A. KING.

Unsoundness in bronze castings. E. J. DANIELS (Inst. Metals, Mar., 1930. Advance copy. 18 pp.).-The work of Karr and Rawdon (cf. B., 1914, 1012; 1915, 1057, 1255), and of Carpenter and Elam (B., 1918, 245 A) on the effect of casting temperature and heat treatment on bronzes has been confirmed. Variations in temperature of casting and the composition of moulds influence the density of the cast alloy. The presence of hydrogen is a cause of unsoundness if the ingot is cooled too rapidly, but the bad influence may be annulled by a considerably longer cooling period. In this respect nitrogen, carbon dioxide, and carbon monoxide were found neutral towards bronze, and, generally, degasification of the molten alloy by means of nitrogen, deoxidisers, or presolidification gave negative results as far as improvement in density was concerned, the lastnamed, however, increasing the tensile strength. It is considered that the normally occurring unsoundness is due to the combined presence of hydrogen and oxygen, as it is different from the effect of hydrogen alone. Improved density when cast in sand is obtained by

melting in a pot furnace with a thin fuel bed and adequate draught. C. A. KING.

Zinc-base die-casting alloys. R. LANCASTER and J. G. BERRY (Inst. Metals, Mar., 1930. Advance copy. 2 pp.).—The addition of 0.1% Mg to a die-cast alloy containing 4% Al, 3% Cu, and 93% Zn decreases appreciably the hot-shortness and increases the tensile strength from 13.5 to 15.7 tons/in.² and the angle of torque from 198° to 270° . With 0.2% Mg the corresponding values fall to 11.88 tons/in.² and 90° , and with 0.5% Mg to 10.76 tons/in.² and 95° . Apparently the magnesium prevents decomposition of the β -phase. A. R. POWELL.

Macrostructure of cast alloys : effect of turbulence due to gases. R. GENDERS (Inst. Metals, Mar., 1930. Advance copy. 6 pp.).-The effect of volatile mould dressings on the macrostructure of brass ingots has been examined. During the casting process the mould dressing volatilises rapidly as the metal rises in the mould and the gases so formed escape through the body of the metal, the turbulence thus produced considerably modifying the macrostructure of the alloy. In long ingots the lowest portion consists of large crystals, but in the uppermost parts a finely-equiaxed structure containing numerous small blow-holes (sponginess) is produced. Photographs of the macrostructure of 70:30 brass cast in treated, partially treated, and in untreated moulds are included. A. R. POWELL.

Aluminium-brasses. R. GENDERS (Inst. Metals, Mar., 1930. Advance copy. 19 pp.).-Addition of aluminium to brass reduces the range of copper content over which the alloy is ductile, but the alloy with 2% Al and 74—76% Cu has an elongation of 83% with a tensile strength of more than 17 tons/in.2, and, owing to its great resistance to corrosion, it would appear to be a suitable alloy for use in the manufacture of condenser tubes. The alloy with 70% Cu and 2% Al is just as readily worked cold as the ordinary 70:30 brass, and is no more prone to season-cracking. Aluminium slightly reduces the workability of brasses at 500°, but at higher temperatures all the brasses become rapidly more plastic. As little as 0.1% Al increases the resistance of brass to oxidation at high temperatures and 2% Al confers a high immunity from oxidation during the annealing process usually performed in the manufacture of brass strip. The production of "red stain" during pickling is completely prevented by 1% Al, and with more aluminium pickling can probably be dispensed with. Careful casting is necessary with aluminium-brasses to prevent inclusion of oxide films, but with good casting conditions continual remelting produces little effect on the mechanical properties and results in only a small change in the chemical composition, the presence of aluminium reducing considerably the loss of zinc by volatilisation. A. R. POWELL.

Concentration of ores by flotation. H. L. SULMAN (Third Empire Min. Met. Congr., Apr., 1930, 54 pp.).— The theory and practice of modern flotation processes are briefly discussed in all their aspects. A. R. POWELL.

Water-concentration tests [for ores]. B. W. HOLMAN (Third Empire Min. Met. Congr., Apr., 1930, 62 pp.).—The value of various small-scale tests, panning, screening, heavy liquid separations, elutriation, and table tests, as a guide to the determination of the most satisfactory large-scale concentration procedure, is discussed with especial reference to certain Cornish tin ores. A. R. POWELL.

Copper concentration as applied to Canadian ores. W. B. MAXWELL (Third Empire Min. Met. Congr., Apr., 1930, 16 pp.).—Details are given of the operation of flotation plants at five Canadian copper mines producing sulphide copper ores containing pyrite and pyrrhotite in a hard rock gangue. Except in minor details the methods used follow standard practice.

A. R. POWELL.

Metallurgical operations at Bwana M'Kubwa. C. S. VAN DER POEL (Third Empire Min. Met. Congr., Apr., 1930, 20 pp.).—Copper is extracted from the oxidised ore of this Rhodesian mine by leaching with a solution of cupric ammonium carbonate. The ore is first crushed to pass a 3-in. mesh and the product is screened on a 1-in. mesh. The oversize from the latter is heated to 350° by passing it through a rotating tube furnace internally fired with producer gas, and the hot ore then enters the reducing chambers, where it meets a current of producer gas which reduces the copper minerals to cuprous oxide and metallic copper, partial reoxidation taking place at the discharge end. The reduced ore and the fines from the previous screening are classified into sands and slimes, the sands being leached in layers 10 ft. deep by downward percolation of the ammonia liquor and the slimes in 4-in. layers in a Merrill filterpress by forcing the same liquor through the press. After washing both residues with a weak leach liquor, the sands are treated with steam and the slimes with hot water and compressed air to remove the remainder of the ammonia and copper. The rich leach liquor is boiled to effect precipitation of the copper and recovery of the ammonia, and the copper oxide is smelted to obtain a marketable product containing 99.88% Cu. Full details of the various operations with flow-sheets and some account of the geology of the deposits are given. A. R. POWELL.

Metallurgy of Transvaal platinum ores. F. WARTENWEILER and A. KING (Third Empire Min. Met. Congr., Apr., 1930, 26 pp.).—A description with analyses is given of the various types of platinum ore which have been treated in the Transvaal for the recovery of their precious metal content. This is followed by a brief account with flow-sheets of the metallurgical methods which are used by the various mines in the production of concentrates by gravity and flotation (cf. Cooper and Watson; also Prentice, B., 1929, 602, 820).

A. R. POWELL. Computation of the probable value of orereserves from assay results. S. J. TRUSCOTT (Third Empire Min. Met. Congr., Apr., 1930, 16 pp.).— An example is given, based on the results of sampling the ore reserves of a gold mine, of the method of calculating the probable value of these reserves. The assays are arranged in regular intervals and from the number of results within every interval the average frequency of these results is calculated. Each assay is then weighted by the product of its frequency and itself, and the sum of these numbers is divided by the sum of the products of the frequency and assay. The result is shown to be a close approximation to the amount of metal subsequently recovered. A. R. POWELL.

Gold milling in Canada. J. J. DENNY (Third Empire Min. Met. Congr., Apr., 1930, 18 pp.).—A brief account, with the flow-sheets of the mills of seven Canadian gold mines, is given of modern methods of treating gold ores in Canada by flotation, amalgamation, and cyaniding. A. R. POWELL.

Gold metallurgy of Witwatersrand banket ores. H. A. WHITE (Third Empire Min. Met. Congr., Apr., 1930, 8 pp.).—Recent progress in the metallurgical treatment of gold ores on the Rand is reviewed. Modern tendencies are to dispense with stamp mills and separate treatment of the sand and slimes and to resort to "all sliming" in tube mills, so that of the ore going to the cyanide vats at least 90% passes 200-mesh.

A. R. POWELL.

Metallic magnesium. W. R. D. JONES (Inst. Metals, Mar., 1930. Advance copy. 4 pp.).—Redistilled magnesium (99·99% Mg) after extrusion and annealing at 462° has a tensile strength of 7.6 tons/in.², an elonga tion of 3%, and a reduction of area of $2\cdot1\%$; the corresponding values for commercial magnesium (0.051% Si, 0.059% Fe, 0.001% Cu, rest Mg) are : 12·1 tons/in.², 6%, and 5%. Quenching from 462° has no effect on these values for redistilled magnesium, but changes these for the commercial metal to 13·7 tons/in.², 3%, and 2.7%, respectively. The Brinell hardness of redistilled magnesium is 37—40, according to the amount of work and heat treatment it has undergone, and that of the commercial metal is 41—42. A. R. POWELL.

Discovery, preparation, properties, and applications of beryllium. G. MARCHAL (Chim. et Ind., 1929, 22, 1084-1092; 1930, 23, 30-33).-A history of the metal is given from the time of its discovery to the publication of the Stock-Goldschmidt process, which first produced the metal in a coherent form in 1921. The principal difficulties in the commercial development of this process are the high losses of metal by volatilisation and the use of sodium barium fluoride, which necessitates batch-working. The latter trouble has been removed by the use of beryllium oxyfluoride and barium fluoride, whilst the volatilisation products are recovered in a lead washer. The same washer may be used for absorbing the carbon fluoride produced. The crucible used is protected from the air by a covering of barium fluoride. The present mode of procedure, in which the current efficiency is 80% and the beryllium yield 95%, is described. A recent American process electrolyses beryllium and sodium chlorides at 700°, but the beryllium must be remelted to render it coherent. No method of electrolysis in solution has yet been successful. As pure beryllium has only recently been prepared the earlier descriptions of its properties are inaccurate. It is a very hard, brittle, steel-grey metal of d 1.84 and m.p. 1278°. In its physical properties it approaches boron in spite of its chemical similarity to aluminium. It is very difficult to work, but has been employed for windows in surgical X-ray tubes. In

alloys it raises the modulus of elasticity, being the only light metal with a high value for this property. It alloys with aluminium, but the products are not superior to alloys of the latter with the much cheaper element silicon. Copper and nickel with small proportions of beryllium form bronzes, the properties of which are greatly improved by heat treatment. They are resistant and sonorous. The pure metal is unaffected by air, but burns in oxygen. It is unaffected by water or by steam at a red heat, but is corroded by ammonium chloride solution and by hydrochloric and sulphuric acids or by hot nitric acid. It may be used as a reducing agent in the same way as aluminium. C. IRWIN.

Metallurgy of duralumin. J. MATHER (Rev. Aluminium, 1929, 6, 915-929).-Curves are given showing the effect of various heat treatments on the hardness and tensile properties of duralumin. The results show the bad effect of heating the metal, at any stage in its fabrication, above 510°; such metal should be immediately returned for remelting. For hot-rolling of duralumin the metal should be heated at 450° and work should cease when the temperature falls to 350°. Soft annealing is effected at 400° followed by slow cooling, but for age-hardening the metal must be quenched from 500°. Heat-treated and aged duralumin may be reheated at 225° for 10 min., at 200° for 1 hr., and at 150° for 100 hrs. without sensibly affecting its characteristic properties. A. R. POWELL.

Rational use of duralumin. M. PUBELLIER (Rev. Aluminium, 1929, 6, 931—949).—Practical hints are given for the heat treatment, mechanical working, joining, and polishing of duralumin, and various methods employed to protect it from corrosion are briefly reviewed. A table showing the mechanical properties of annealed, normal, and age-hardened duralumin is included. A. R. POWELL.

Almasilium. J. SUHR (Rev. Aluminium, 1929, 6, 955-972).-Almasilium is essentially an alloy of aluminium and magnesium silicide containing a slight excess of silicon and sometimes small amounts of chromium and manganese. The most satisfactory alloy is that with 1% Mg and 2% Si, which in the annealed state has an elastic limit of 5.6 kg./mm.², tensile strength of 10.6 kg./mm.², and elongation 29.5%; after quenching from 550° these values become 17.3, 29.2, and 27.5, respectively, but subsequent ageing at 175° for 6 hrs. produces a tensile strength of 40 kg./mm.² with an elongation of 6% and elastic limit of 36 kg./mm.2 Addition of 0.5% Cr or of 0.5% Mn increases slightly the tensile strength, elastic limit, and hardness, but reduces the elongation. The metal takes a high polish and may be employed in place of mild steel for many purposes where good working properties combined with a high strength are required.

A. R. POWELL.

Cold-working of lead, tin, and cadmium at different temperatures. A. MOLNAR (Compt. rend., 1930, 190, 587-589).—Cold-working of lead to the extent of 25-50% at -40° to -75° produces a permanent increase in hardness, whilst at -40° to $+50^{\circ}$ the hardness returns to its original value at a rate which is greatest at the higher temperatures and is almost instantaneous above 50°. For tin and cadmium the effect is permanent below -20° and -40° , and recovery is instantaneous at $+50^{\circ}$ and $+25^{\circ}$, respectively. J. GRANT.

Spectrographic determination of cadmium, lead, and iron in zinc. D. M. SMITH (Trans. Faraday Soc., 1930, 26, 101—117).—A review is given of the methods of spectrographic examination of alloys for traces of impurities and the relative merits of the methods are compared. The arc method is to be preferred on account of its greater sensitivity in the case of lead. By the technique described impurities may be determined with certainty between definite limits and can be estimated approximately within these limits. Values are given of the wave-lengths and intensities of the most suitable lines for the identification and estimation of cadmium, lead, and iron in zinc of various qualities. F. G. TRYHORN.

Rapid volumetric method for determination of lead. R. C. WILEY (Ind. Eng. Chem. [Anal.], 1930, 2, 124—126).—The lead in the material is separated as sulphate and boiled with sodium carbonate to convert it into carbonate, which is dissolved in nitric acid. Ammonia is added until a permanent precipitate appears, an excess being avoided, and the solution is titrated at a temperature near its b.p. with sodium molybdate solution, a 1 : 1 mixture of stannous chloride and potassium thiocyanate dissolved in a little water being employed as external indicator; a red colour is produced when the end-point has been reached. The method can be used for the determination of lead in alloys containing antimony and tin; small amounts of iron and copper do not interfere.

H. F. HARWOOD.

Atmospheric action in relation to fatigue in lead. B. P. HAIGH and B. JONES (Inst. Metals, Mar., 1930. Advance copy. 11 pp.).—Observation on the fatigue cracking of lead shows that the mode of fracture in the exterior metal is quite different from that of the interior, which is probably a characteristic of all fatigue fractures. The fracture in the marginal zone is usually formed by shearing along the surface of a "cup and cone," and is intercrystalline only in exceptional cases as in lead and certain other metals. The inner zone varies very little in character in relation to grain size, and it is thought that the inner zone reveals the fundamental action of fatigue and that the character of the marginal ring is relatively unimportant. In lead and lead alloys the inner zone is discoloured, which suggests oxidation, and it is inferred that oxygen diffuses through the metal during a fatigue test in air, reaching a depth at which the fatigue crack shows the characteristic form and discoloration. Fatigue was delayed when test pieces were immersed in oil or water or when protected by a layer of grease, and was eliminated when immersed in acetic acid, though unaffected if the surface of the test piece was only moistened with acetic acid during the test. Reduction in fatigue strength under the surface action of reagents is attributed only in small degree to superficial action and chiefly to diffusion into the metal of foreign substances that promote chemica or physical change under cyclic stress. C. A. KING. Electrochemistry of chromium. A. V. PAMFILOV and G. F. FILLIPITSCHEV (J. Russ. Phys. Chem. Soc., 1929, **61**, 2221—2244).—The generally accepted opinion that chromium plating proceeds satisfactorily only with high concentrations of chromic acid, and in the absence of other than negligible quantities of tervalent chromium, is not correct, as electrodeposition of chromium takes place satisfactorily from chromium sulphate solutions containing 4—160 g. Cr per litre, the yield of metal being 0—25%, according to the voltage used, the density of current, etc. The yield and the quality of the deposit are better at 0.5 than at 0.05 amp. Carveth and Mott's view (B., 1905, 625) that the presence of bivalent chromium in the solution is essential to ensure proper deposition of metal is not confirmed.

R. TRUSZKOWSKI.

Protective value of some electrodeposited coatings. L. DAVIES and L. WRIGHT (Inst. Metals, Mar., 1930. Advance copy. 12 pp.).—The protective value of coatings of zinc, cadmium, nickel, and chromium, 0.0001, 0.0005, 0.001, and 0.002 in. thick on steel, brass, phosphor-bronze, and copper has been determined by subjecting the plated metals to sprays of sodium chloride solution (24 g./litre) and 0.05N-sulphuric acid. Cadmium afforded better protection than zinc to all the metals in the acid spray, but the thin zinc deposits were better than the corresponding cadmium deposits in the salt spray. Chromium afforded no protection whatever to steel, but gave excellent protection to the non-ferrous metals tested. Only the thickest nickel deposit gave any degree of permanent protection to steel, but the non-ferrous metals were well protected by 0.001 in. of nickel deposit. A. R. POWELL.

PATENTS.

Cupola furnaces. F. A. STEVENSON, Assr. to ECONOMY METAL PRODUCTS CORP. (U.S.P. 1,733,138-1,733,141, 29.10.29. Аррl., [А] 7.2.28, [В] 29.6.28, [С, D] 26.2.29).-(A) A portion of the lining of the cupola consists of a number of loosely fitting rings composed of numerous segments connected together in such a way that every ring and segment can expand individually. (B) The upper part of the shaft has a metal lining surrounded by an outer sheathing, forming an annular chamber through which cooling air is passed. (c) A portion of the shaft is lined with a series of superimposed rings, and is surrounded by a sheathing so as to form a preheating chamber for the air; means independent of the sheathing are provided for preventing distortion of the rings. (D) The rings are maintained in vertical alinement by means of retainers supported close to the junction of the rings by fixtures at the top and bottom of the annular A. R. POWELL. heating chamber.

[Annealing] furnace and its operation. E. H. SWINDELL and F. W. BROOKE, ASSTS, to W. SWINDELL & BROS. (U.S.P. 1,741,209, 31.12.29. Appl., 29.1.23).— The furnace comprises a high-temperature, electricallyheated chamber with low-temperature, fuel-fired, preheating chambers on each side of it, so arranged as to minimise heat losses from the central chamber. The articles to be annealed pass through an outside chamberinto the central chamber continuously on a series of

trucks running on rails, those leaving the central chamber passing close to those entering it to effect a heat interchange. A. R. POWELL.

Heat treatment of metals. A. A. SOMERVILLE, Assr. to R. T. VANDERBLIT Co., INC. (U.S.P. 1,742,791, 7.1.30. Appl., 15.7.26).—Oils used for tempering and quenching metals may be stabilised by the addition of a small amount of a condensation product of an aldehyde with ammonia or an amine, *e.g.*, of formaldehyde, acetaldehyde, etc. with aniline, naphthylamine, etc.

A. R. POWELL. Production and utilisation of carbon monoxide [for treatment of iron ores]. L. BRADLEY (U.S.P. 1,742,750, 7.1.30. Appl., 7.4.26).-In the smelting of iron ores in the blast furnace, the blast used comprises a mixture of carbon dioxide and oxygen with subordinate amounts of nitrogen, with or without a certain proportion of steam, and the molten iron produced is tapped into an open-hearth furnace which is fired with the gas mixture obtained from the blast-furnace flues; this gas has a high content of carbon monoxide and hydrogen. Part of the waste gases from the open-hearth furnace and part of those from the blast furnace are mixed with oxygen and the mixture is returned to the tuyères of the blast furnace after being preheated by further quantities of the flue gases. A. R. POWELL.

Carburising material [for iron or steel]. G. W. PRESSELL, Assr. to E. F. HOUGHTON & Co. (U.S.P. 1,741,336, 31.12.29. Appl., 14.7.28).—Granular carbonaceous material is coated with a mixture of barium carbonate and lime mixed with molasses, and the grains are then coated with kieselguhr and finally with an energising substance, e.g., manganese dioxide. The product is a highly efficient case-hardening agent.

A. R. POWELL.

Production of soft iron. B. WEISHAN (U.S.P. 1,742,111, 31.12.29. Appl., 11.3.27. Ger., 29.9.26).— Puddled iron is formed into bars of equilateral triangular cross-section with a flattened apex, six of these bars are bound together to form a hexagonal bundle with a central, longitudinal passage-way, and the bundle is then welded into a coherent whole by rolling, whereby slag is extruded from the central hole and a bar having a long-grained fibrous structure is obtained.

A. R. POWELL.

Inhibitor [for steel pickling]. H. P. CORSON, Assr. to GRASSELLI CHEM. Co. (U.S.P. 1,742,986, 7.1.30. Appl., 9.8.28).—A small quantity of cinchona bark alkaloid, especially quinoidine, is added to the usual acid pickling bath. A. R. POWELL.

Manufacture of metal [iron] powders suitable for magnet cores. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 325,526, 21.9.28).—A mixture of 40% of iron powder, prepared by the thermal decomposition of iron carbonyl, and 60% of a similar powder which has been purified by heating in hydrogen at 500° is formed into a core in the usual way. A. R. POWELL.

Manufacture of magnetic [iron-nickel] alloys. BRIT. THOMSON-HOUSTON CO., LTD., Assees. of W. E. RUDER (B.P. 314,971, 1.10.28. U.S., 6.7.28).—An alloy of 40—50% of electrolytic nickel and 60—50% of iron free from impurities is melted in an induction furnace in hydrogen or in a vacuum and the ingots are rolled into sheet which is annealed at 1200—1300° for 2—10 hrs. until a large twin-crystal structure is obtained. The alloy has a high initial permeability, and is thus suitable for transformer cores. A. R. POWELL.

Applying zinc coatings to iron articles. T. LIBAN (B.P. 325,540, 21.11.28).—The zinc bath is covered with a layer of molten salts comprising 0.5— 6% of sodium aluminium chloride, 10-20% of ammonium chloride, and 74-89.5% of zinc chloride. When the combined lead-zinc galvanising bath is used the salt mixture is placed above the lead portion of the bath.

A. R. POWELL.

Welding of silicon-containing steel alloys. F. KRUPP A.-G. (B.P. 313,434, 4.3.29. Appl., 11.6.28).— A welding rod containing about 1.5—3% Mn is used for arc-welding steel sheets containing more than 0.3% Si, so that the joint contains at least 0.3% Mn. A. R. POWELL.

Froth-flotation concentration of ores. MINERALS SEPARATION, LTD., Assees. of C. H. KELLER (B.P. 301,832, 5.12.28. U.S., 6.12.27).—The flotation agent used is the heavy oil obtained by refluxing an aromatic hydrocarbon, *e.g.*, benzene, with sulphur and aluminium chloride or with sulphur monochloride and zinc; the reagent consists chiefly of phenyl sulphide.

A. R. POWELL.

Treatment of minerals containing potassium, aluminium, and iron. C. E. ARNOLD, ASST. to ELECTRO Co. (U.S.P. 1,742,191, 7.1.30. Appl., 19.2.25).—The mineral, e.g., greensand, is heated with sulphuric acid and the filtered solution is evaporated until the anhydrous sulphates separate. These are collected and heated at 500° to decompose ferric sulphate, the product is ground with water in a ball mill, and the ferric oxide collected for use as a pigment. The filtrate is evaporated and crystallised to obtain potassium aluminium sulphate. A. R. POWELL.

Refining of asbestos ore. F. A. METT, Assr. to POWHATAN MINING CORP. (U.S.P. 1,741,869, 31.12.29. Appl., 23.8.23).—The material passes through a jaw breaker into rolls immersed in a vessel through which an upward current of water is rising. The discharge from the rolls is thus graded into coarse sand, which sinks, and partially purified fibres, which float over to another vessel containing a submerged, inclined, reciprocating screen by the action of which the remainder of the sandy material is separated from the asbestos fibre. The latter floats away as a dense mat into a settling chamber. A. R. POWELL.

Briquetting of flue dust. E. A. SLAGLE and B. M. O'HARRA, ASSTS. to AMER. SMELTING & REFINING CO. (U.S.P. 1,741,544, 31.12.29. Appl., 9.9.26).—Dust from furnace flues, bag-houses, or the Cottrell plant is briquetted by mixing it with up to 2% of an acid deflocculating substance, *e.g.*, sulphuric acid, and the necessary water to give a paste suitable for the briquetting machine. A. R. POWELL.

Manufacture of multiple metals [iron impregnated with copper]. INTERNAT. GEN. ELECTRIC CO. INC., Assees. of ALLGEM. ELEKTRICITÄTS-GES. (B.P. 308,819, 27.3.29. Ger., 31.3.28).—Powdered iron, with or without a binding material, is pressed into the desired shape, covered with powdered copper, and heated until the copper melts and runs into the pores of the sintered iron, thus displacing the binder and making a tough, coherent mass. A. R. POWELL.

Provision of insulating coatings on aluminium or aluminium alloys. Associated ELECTRICAL INDUSTRIES, LTD., Assees. of L. MCCULLOCH (B.P. 300,912, 19.11.28. U.S., 19.11.27).—The metal is suspended in boiling water, to which are added 5 g. of slaked lime and 5 g. of gypsum per litre, whereby a coherent white film containing about 76.8% Al₂O₃, 8.1% CaO, and 15.1% SO₄ is obtained after washing and drying at 200°. The film may be rendered more insulating by impregnating it with collodion or varnish. A. R. POWELL.

Production of beryllium alloys, in particular those with a high beryllium content, by means of fused electrolysis. SIEMENS & HALSKE A.-G. (B.P. 325,762, 23.5.29. Ger., 13.11.29).—The metal to be alloyed with the beryllium forms part or all of the anode of the cell, and the electrolyte is such that this metal is dissolved anodically and redeposited together with beryllium at the cathode, the temperature of the electrolyte being below that of the m.p. of the anode metal. The process is suitable for the production of copper or nickel alloys with 15—35% Be, which are useful as a means of introducing small quantities of beryllium into copper or nickel. A. R. POWELL.

Production of metals in electric furnaces. E. G. T. GUSTAFSSON (U.S.P. 1,751,083, 18.3.30. Appl., 11.5.27. Swed., 27.9.26).—See B.P. 278,005; B., 1928, 790.

Smelting process [for low-carbon cast iron]. F. Wüst (U.S.P. 1,751,185, 18.3.30. Appl., 18.10.27. Ger., 6.8.26).—See B.P. 275,646; B., 1928, 372.

Apparatus for reducing oxides of metals [copper, lead, or zinc]. J. W. HORNSEY, Assr. to GRANULAR IRON CO. (U.S.P. 1,751,736, 25.3.30. Appl., 8.9.26).—See B.P. 277,325; B., 1928, 931.

Manufacture of zinc from oxygen compounds of zinc or substances containing them. C. FREIHERR VON GIRSEWALD and H. NEUMARK (U.S.P. 1,751,778, 25.3.30. Appl., 12.10.28. Ger., 13.10.27).—See B.P. 298,636; B., 1929, 725.

Apparatus for continuous treatment of metal bodies. M. FOURMENT (U.S.P. 1,749,700, 4.3.30. Appl., 22.12.26. Fr., 29.12.25).—See B.P. 263,774; B., 1927, 943.

[Aluminium] alloy. P. BARTHÉLEMY and H. DE MONTBY (U.S.P. 1,750,700, 18.3.30. Appl., 9.8.27. Fr., 20.5.27).—See F.P. 634,751; B., 1930, 289.

Aluminium alloy. A. GEYER (U.S.P. 1,750,751, 18.3.30. Appl., 25.6.27. Fr., 4.2.27).—See B.P. 284,722; B., 1929, 100.

Autogenous welding of magnesium and its alloys. G. MICHEL, Assr. to H. O. BERG (U.S.P. 1,749,712, 4.3.30. Appl., 5.2.25. Fr., 23.12.24).—See B.P. 261,528; B., 1927, 80. Manufacture of hard-metal alloys. K. SCHRÖTER, Assr. to GEN. ELECTRIC Co. (Re-issue 17,624, 18.3.30, of U.S.P. 1,549,615, 11.8.25).—See B., 1925, 766.

Protection of metals [from amalgamation with mercury]. S. Z. DE FERRANTI, ASST. to FERRANTI, LTD. (U.S.P. 1,752,239, 25.3.30. Appl., 10.2.25. U.K., 4.3.24).—See B.P. 234,210; B., 1925, 597.

Protection of readily oxidisable metals [magnesium and its alloys]. G. MICHEL, ASST. to H. O. BERG (U.S.P. 1,749,713, 4.3.30. Appl., 13.8.25. Fr., 20.3.25).—See B.P. 249,484; B., 1927, 785.

Decorating [tinplate] metal [with bronzing preparation]. J. DE FRENE (B.P. 326,257, 13.12.28).

Furnaces for de-tinning metal plates and other articles or surfaces coated with block tin or other like material. LEEDS DE-TINNING, LTD., and A. W. CALVERT (B.P. 326,237, 8.12.28).

Apparatus for electromagnetic separation of minerals. A. DAVIES (B.P. 326,223, 9.11.28).

Heat-treatment furnaces (B.P. 325,552).—See XI. Transferring subjects to metal (U.S.P. 1,742,710).— See XXI.

XI.—ELECTROTECHNICS.

Gas formation and dissociation due to electric arcs in oil. A. von Engel (Wiss. Veröff. Siemens-Konz., 1930, 8, [iii], 97-108).—The theory of the formation of gas in electric oil-switches has been investigated. The energies of vaporisation and of dissociation of the paraffins have been calculated from the heat of formation and from the combustion equations. The formation of gas and soot by the dissociation of paraffins depends, in amount, on the ratios of the hydrogen, acetylene, and methane formed. Calculations show that the amount of gas formed is much smaller than that theoretically possible from the energy liberated in the arc when the switch is opened. It is concluded that the rest of the energy is utilised in raising the temperature, in general, so that the highest temperature in the switch is such that dissociation of the paraffins can W. E. DOWNEY. take place.

Gas-filled photoelectric cells: their properties and calibration. J. KUNZ and V. E. SHELFORD (Rev. Sci. Instr., 1930, 2, 106—117).—Spherical cells show a direct proportionality between light intensity and current up to a limit depending on the size of the cell. For ecological work a cell with a convex sensitive surface is the most satisfactory. With concave surfaces the response depends very largely on the angle of incidence. C. W. GIBEY.

Hydrocarbons and a high-tension discharge. BECKER. High-tension currents and brine-petroleum emulsions. STARZEWSKI.—See II. Paper for cables. GYEMANT.—See V. Phosphoric acid production. Kochs; KLUGH.—See VII. Chromium. PAMFILOV and FILLIPITSCHEV. Protective coatings. DAVIES and WRIGHT. Magnetic alloys. ELMEN.— See X.

PATENTS.

Electric heating apparatus for liquids. H. H. HENNING (B.P. 325,258, 12.11.28).—Electric current

passes between electrodes immersed in liquid to be heated contained in an electrically-insulated vessel; the lower portions of the electrodes are parallel and overlapping, but the upper portions diverge widely, so that current in the liquid is concentrated in the lower part. J. S. G. THOMAS.

Electrodes for electric heat-treatment of metallic articles. F. W. THOMPSON (B.P. 325,552, 18.10.28).— Graded resistance elements provide paths of different electrical resistance between the source of current and the article to be treated, so that the portions of the article and electrode in contact may be given any desired temperature gradient. J. S. G. THOMAS.

[Carbonaceous] electrical resistor, conductor, etc. J. KELLEHER, ASST. to HARPER ELECTRIC FURNACE CORP. (U.S.P. 1,742,259, 7.1.30. Appl., 17.7.25).— Carbonaceous material, coated with silicon carbide and borax, is heated in air until the borax melts, and a semi-plastic coating composed internally principally of silicon carbide and externally of oxidised boron is produced. J. S. G. THOMAS.

Luminous electric discharge tubes. GEN. ELEC-TRIC Co., LTD., Assees. of PATENT-TREUHAND-GES. F. ELEKTR. GLÜHLAMPEN M.B.H. (B.P. 315,704, 1.7.29. Ger., 16.7.28).—In luminous tubes filled with common gases and containing a substance which is heated during operation of the tube to replenish its gas content, an absorbent substance, *e.g.*, tin, bismuth, lead, or gold, which does not react with the gas is mixed with the gas-emitting substance to form a compound or alloy of very low vapour pressure with the residue resulting from the decomposition, *e.g.*, with the alkali or alkalineearth metal that has given up nitrogen or hydrogen to the gas filling. J. S. G. THOMAS.

Electric discharge tubes. GEN. ELECTRIC CO., LTD., and N. R. CAMPBELL (B.P. 325,885, 3.12.28).— The insulation resistance of discharge tubes containing the vapours of an alkali metal (or metals) is increased by filling the tubes with hydrogen at a pressure of a few mm. of mercury. If desired, a discharge may be passed through the gas. [Stat. ref.] J. S. G. THOMAS.

Electron-discharge device. A. J. KLONECK (U.S.P. 1,742,262, 7.1.30. Appl., 23.10.22).—One of a number of electrodes arranged in a bulb is coated with silver upon which a coating of an alkali oxide is deposited, whilst of the others, one is covered with mercury and another with an active alkali amalgam.

J. S. G. THOMAS.

Thermionic cathodes for electric-discharge devices. STANDARD TELEPHONES & CABLES, LTD., and L. H. BEDFORD (B.P. 325,492, 16.11.28).—Pure alkalineearth metal(s) is deposited from the vapour state upon a coating of oxide(s) of the same metal(s) formed upon a core, e.g., of platinum-nickel, so that the thermionicallyactive material consists of a complex of alkaline-earth metal and oxide. If, e.g., barium be used, the metal may be deposited from the product resulting from firing a mixture of barium oxide, barium peroxide, and aluminium with a fuse powder. J. S. G. THOMAS.

[Cathode for] gas-filled electric-discharge devices. SIEMENS & HALSKE A.-G. (B.P. 302,583, 14.12.28. Ger., 17.12.27).—A refractory-metal core e.g., of tungsten or molybdenum, is coated with one or more rare-earth metals, e.g., lanthanum, cerium, ytterbium, or elements of similar emissive characteristics, e.g., yttrium, zirconium, together with thorium, if desired. J. S. G. THOMAS.

[Manufacture of] cathodes for thermionic devices. P. FREEDMAN (B.P. 325,317, 4.12.28 and 29.8.29).—A coating consisting principally or wholly of one or more alkaline-carth carbonates is electrolytically deposited upon a metallic core, e.g., of platinum, tungsten, nickel, ferronickel (64% Fe, 36% Ni), from an electrolyte containing alkaline-earth compounds and carbon dioxide. If desired, the electrolyte may contain methyl or ethyl alcohol together with acetone and/or amyl acetate, ether, pyridine. An electrolytically deposited catalyst, e.g., an oxide of chromium, magnesium, calcium, cadmium, may be incorporated in the coating.

J. S. G. THOMAS.

Wehnelt cathodes. N.V. PHILIPS' GLOEILAMPEN-FABR. (B.P. 309,578, 18.3.29. Holl., 13.4.28).—A core coated with a suspension of barium carbonate, beryllium carbonate, zirconium oxide, and, if desired, an agglutinant, *e.g.*, gum arabic, is heated at about 1000°, preferably *in vacuo*. J. S. G. THOMAS.

[Contact] current-rectifying device. W. O. SNEL-LING (U.S.P. 1,742,324, 7.1.30. Appl., 26.1.23).—A compound of a metal with an element of the sulphur group is employed. Thus, *e.g.*, a consolidated mixture of red lead and sulphur is heated at above the m.p. of sulphur. J. S. G. THOMAS.

Introducing alkaline-earth or rare-earth metal vapours into evacuated or partially evacuated vessels [e.g., electric vacuum tubes]. STANDARD TELEPHONES & CABLES, LTD., and L. H. BEDFORD (B.P. 325,534, 16.11.28).—The oxide of the metal is reduced aluminothermically and the mass powdered, mixed with paraffin wax, and applied as a paste to a valve plate. In this way barium may be conveniently introduced into a radio valve and, after evacuating the valve, the barium is readily volatilised. A. R. POWELL.

[Solid depolarising electrolyte for] primary electric cells and batteries. A. SCHMID, and METRO-POLE DEVELOPMENTS, LTD. (B.P. 325,483, 17.9.28).— An oxidising agent, e.g., sodium dichromate and/or chromic acid, is mixed to a paste with concentrated sulphuric acid and solidified by addition of silicic acid or water-glass. J. S. G. THOMAS.

[Positive plates for] electric accumulators [having an alkaline electrolyte]. O. Y. IMRAY. From I. G. FARBENIND. A.-G. (B.P. 325,581, 22.11.28).— The active mass consisting of oxygen compounds of nickel or cobalt, moistened, if desired, with a highly viscous water-soluble liquid, e.g., glycerin, is mixed with foliated graphite of dimensions 0.06-0.75 mm., subjected to high pressure, e.g., 3500 kg./cm.², and charged into pockets in the plates.

J. S. G. THOMAS.

Manufacture of porous bodies, more particularly for electro-osmotic purposes. SIEMENS & HALSKE A.-G. (B.P. 305,020, 2.1.29. Ger., 28.1.28).—Diaphragms

for electric endosmosis are made by stirring one or more acid- and alkali-proof inorganic compounds with an acid- and alkali-proof hardening solvent, which is subsequently removed by heating the pressed mass at a low temperature (300°). If desired, the pore volume is increased by addirg to the initial materials substances which can subsequently be removed either by dissolution or heat-treatment. Thus, *e.g.*, heavy spar, chromium oxide, or aluminium oxide, together with, if desired, sawdust, naphthalene, sodium chloride, potassium chloride, or copper sulphate, are added to a solution of celluloid in amyl acetate or to a solution of natural asphalt, the resulting mass being pressed and heated. J. S. G. THOMAS.

Production of insulating masses of high disruptive strength. SIEMENS & HALSKE A.-G. (B.P. 306,900, 19.2.29. Ger., 27.2.28).—A gas or vapour is passed into liquefied material at such temperature that the gas or vapour is decomposed and finely-divided metal is deposited and remains suspended in the liquid. Thus jets of vaporised iron carbonyl or nickel carbonyl may be injected into melted paraffin, or silicon hydride or boron hydride into molten glass or enamel.

J. S. G. THOMAS. **Treatment of liquids and organic substances** by irradiation. V. C. FROM, C. D. ROWLEY, and A. W. LARSKY (B.P. 325,824, 23.11.28, 21.12.28, and 2.2.29).—Substances are subjected to the simultaneous action of ultra-violet and infra-red radiation at about 0—15° in the presence of ozone. Suitable apparatus is described. J. S. G. THOMAS.

Manufacture of liquid or solid products by gaseous reaction under the influence of silent electrical discharge. I. G. FARBENIND, A.-G. (B.P. 300,282, 10.11.28. Ger., 11.11.27. Addn. to B.P. 304,623; B., 1929, 290).—Deposition of reaction products is prevented on one electrode only. Thus, in the manufacture of hydrogen peroxide, the outer tube is cooled to 20° and the inner to 60° only, so that no condensation of hydrogen peroxide occurs on the inner tube. J. S. G. THOMAS.

[Nickel] anode and its manufacture. W. J. HARSHAW, P. M. SAVAGE, and F. K. BEZZENBERGER, ASSTS. to INTERNAT. NICKEL CO., INC. (U.S.P. 1,751,630, 25.3.30. Appl., 28.11.27).—See B.P. 314,667; B., 1929, 688.

[Plastic mass for] electric accumulator [plates]. H. LEITNER (U.S.P. 1,750,230, 11.3.30. Appl., 28.3.29. U.K., 27.3.28).—See B.P. 316,328 ; B., 1929, 824.

Securing good electrical contact with crystalline cuprous oxide. W. T. ANDERSON, JUN., and L. F. BIRD, Assrs. to HANOVIA CHEM. & MANUFG. Co. (U.S.P. 1,749,995, 11.3.30. Appl., 28.10.27).—See B.P. 307,962; B., 1929, 401.

[Method of supporting bricks of] electric furnaces. WILD-BARFIELD ELECTRIC FURNACES, LTD., and L. W. WILD (B.P. 325,548, 21.11.28).

Electric discharge tubes. S. G. S. DICKER. From N.V. PHILIPS' GLOEILAMPENFABR. (B.P. 325,870, 1.11.28). Electric discharge devices. [Lightning arresters.] BRIT. THOMSON-HOUSTON CO., LTD., Assees. of J. E. POTTER (B.P. 302,168, 10.12.28. U.S., 10.12.27).

X-Ray tubes. N.V. PHILIPS' GLOEILAMPENFABR. (B.P. 310,001, 15.4.29. Holl., 19.4.28).

Apparatus for treating liquids with ultra-violet rays. Apparatus for producing ultra-violet rays. E. O. SCHEIDT, and FOODSTUFFS IRRADIATION Co., LTD. (B.P. 326,249 and 326,250, 10.12.28).

[Spiral filaments for] electric incandescence lamps. Gen. Electric Co., Ltd., Assees. of Patent-TREUHAND GES. F. ELEKTR. GLÜHLAMPEN M.B.H., (B.P. 316,612, 5.7.28. Ger., 1.8.28).

Electric batteries and electrodes therefor. C. H. EVERETT and G. R. CARR (B.P. 303,472, 10.8.28. U.S., 4.1.28).

Pyrometer (B.P. 324,500). Colorimeters (B.P. 324,351 and 324,495).—See I. Pottery kilns (B.P. 325,794). Furnace linings or crucibles (B.P. 325,661). —See VIII. Magnet cores (B.P. 325,526). Magnetic alloys (B.P. 314,971). Insulating coatings (B.P. 300,912). Beryllium alloys (B.P. 325,762).—See X.

XII.—FATS; OILS; WAXES.

Thiocyanates of unsaturated fatty acids. W. KIMURA (J. Soc. Chem. Ind. Japan, 1930, 33, 58—59 B, and Chem. Umschau, 1930, 37, 72—74).—The thiocyanogen additive products of oleic, elaidic, and brassidic acid, prepared by the action of free thiocyanogen on the acids in carbon tetrachloride solution, have been isolated in the pure condition. The oleic acid derivative was a pale yellow oil, but *elaidic* and *brassidic thiocyanates*, on recrystallisation from absolute alcohol, formed fine needle-shaped crystals having m.p. $79-79\cdot5^{\circ}$ and $57\cdot5-58^{\circ}$, respectively. These compounds are insoluble in water, but soluble in absolute alcohol, ether, carbon tetrachloride, and acetic acid. E. LEWKOWITSCH.

Fatty oil from tobacco seeds. M. P. PIATNITZKI (U.S.S.R. State Inst. Tobacco Invest., 1929, Bull. 61, 20 pp.).—Tobacco seeds on extraction with light petroleum yielded an oil (unsaponifiable matter $1 \cdot 2\%$) containing about 60% of linoleic, $21 \cdot 7\%$ of oleic, $9 \cdot 6\%$ of palmitic acid, and about 10% of glycerol. Linolenic acid appears to be absent. No alkaloids have been found in the oil. W. O. KERMACK.

Tung oil. VI. A. EIBNER and E. ROSSMANN (Chem. Umschau, 1930, 37, 65-71).-The hypothesis of the formation of preliminary cracks in a drying wood oil film (cf. B., 1928, 934) is rejected and the observations and conclusions of Blom (cf. B., 1929, 783) that the primary wrinkling is due to the development of introverted folds are confirmed and extended, and photomicrographs of the phenomenon are shown. Similar folds can be produced artificially by pressure along the surface of the skin in linseed oil films. The occurrence of strain double-refraction in old and fresh wrinkled wood oil films is confirmed ; with poppyseed oil films this property is lost after a few weeks. The isomerisation of wood oil on exposure to light and the rôle of β-elæostearin in the drying process are discussed. E. LEWKOWITSCH.

ANDWIISCH.

tests with rats indicate that the antirachitic value of the Cacao butter. III. Concentration of the unsaturated components of cacao butter in order to fats is considerably increased by irradiation.

C. W. SHOPPEE.

Deodorisation of fish oils. K. HASHI (J. Soc. Chem. Ind. Japan, 1930, 33, 58 B).-By polymerisation of fish oil in an atmosphere of hydrogen at 280-290° for 14 hrs. the characteristic odour of the oil disappears, and is not regenerated by hydrolysis, heating, or keeping of the product. It is found that oils deodorised by various processes can be preserved without alteration at room temperature in diffused light, but that irradiation with strong sunlight rapidly causes the products to become odorous. C. W. SHOPPEE.

Relation between the refractive index and the iodine and saponification values of cod-liver oil. F. ENDER and A. JERMSTAD (Pharm. Zentr., 1930, 71, 193-195) .- The refractive indices, iodine and saponification values of 50 samples of medicinal cod-liver oil have been determined. A low iodine value, in general, corresponds with a low refractive index, but there is no well-defined relationship between the saponif. value and refractive index. The constants determined fall within the following limits: $n_{\rm D}^{20}$ 1.4787-1.4795, iodine value 163.6—169.3, saponif. value 184.6—187.4, unsaponifiable matter 0.80-1.16. E. H. SHARPLES.

Thiocyanogen value of marine-animal oils and some of their constituents. Y. TOYAMA and T. TSUCHIYA (J. Soc. Chem. Ind. Japan, 1930, 33, 31-35 B).-The thiocyanogen values of sardine, cod-liver, herring, and sperm oils and of squalene were determined, using the reagent of Kaufmann (A., 1925, i, 1252), and indicate the presence of unsaturated acids having more than one double linking. Fairly constant values are obtained if the conditions of the experiment are constant, the mean molecular unsaturation agreeing closely with the theoretical in the case of pure unsaturated acids and alcohols. K. V. THIMANN.

Bentonite and allied clays. WOODMAN and TAYLOR. -See XVI.

PATENTS.

Manufacture of condensation products [from oils and waxes]. A. CHWALA (G.P. 456,351, 7.4.23; cf. Austr. P. 104,727) .- Thick viscous liquids or pasty solids having a high capacity for taking up water are produced by condensing rape-seed oil and carnauba wax with acetone at 90-100° under pressure, especially in presence of a little iron oxide. Other examples are : castor oil and paraformaldehyde (or acetone in presence of zinc dust); beeswax, vaseline, and formaldehyde (or acetone) in presence of finely-divided iron.

C. HOLLINS.

Production of a wax-like body. J. BAER (B.P. 300,200, 26.10.28. Switz., 8.11.27).-Alkylene halides, e.g., ethylene chloride, alone or mixed with formaldehyde, acetaldehyde, etc., are treated at the ordinary or at a raised temperature with dilute ammonium sulphide solution and the product is purified by heating in the presence of alkalis. [Stat. ref.] L. A. COLES.

Extraction of [fatty] oils. J. W. BECKMAN (B.P. 326,195, 7.9.28).—See U.S.P. 1,698,294; B., 1929, 608.

ascertain the purity. H. P. KAUFMANN (Chem. Umschau, 1930, 37, 17-21. Cf. B., 1929, 441; 1930, 247). IV. Detection of hardened fats by spectroscopical identification of nickel. H. P. KAUFMANN and M. KELLER (Ibid., 49-60).-III. In a few cases the adulteration of cacao butter (e.g., by Makron butter) may be indicated by an abnormal thiocyanogen value. By removal of the more saturated component glycerides of cacao butter by crystallisation from acetone (20 g. dissolved in 200 c.c. is kept for 6-20 hrs. at 15°, and then for 1 hr. at 5°, when the precipitate is removed by filtration) a more unsaturated soluble fraction is obtained, of which the iodine value (54-58, usually 55-56) is characteristic for expressed cacao butter. All other [unhardened] fats are more soluble in acetone than is cacao butter and pass into the soluble fraction and the iodine value ("enriched iodine value") of the latter is either increased above (e.g., with cottonseed and soyabean oils) or depressed below (with coconut oil as adulterant) the normal value. Additions to caeao butter of 2% of coconut and/or cottonseed oil etc. are clearly detected by this method.

IV. The iodine value of typical hardened fats (coconut, arachis, whale, etc.) was approximately the same as the thiocyanogen value : the "partial iodine value " (determined by bromine), however, which in the original oils is about equal to the thiocyanogen value, falls considerably below it (sometimes down to 50%) in hardened oils. Similar relations between these constants is found with the "solid acids" from the lead saltalcohol separation of the hardened oils. The characteristic low partial iodine value may on occasion reveal the presence of hardened fats in cacao butter; the test becomes more sensitive if applied to the acetonesoluble fraction as described above. With only small admixtures of hardened fats the results are inconclusive, and the most reliable indication of such adulteration is given by proof of the presence of nickel. The chemical processes extant for this purpose are reviewed at some length, and details of a new spectroscopic analysis have been worked out. The nickel solution obtained from cautiously ashed fat (1-50 g.), or by acid extraction, is electrolysed, the nickel being deposited on the tip of copper-plated platinum wire electrodes, and subsequently identified by its spark spectrum. Careful manipulation is essential, but quantities down to 10^{-6} mg. of nickel (0.0001 mg. of nickel/kg. of fat mixture ; 0.001 mg./kg. was the lowest found in any pure hardened fat) can be identified with certainty : nickel could not be found in any pure cacao butter examined, nor even in a fat that had been stirred for $\frac{1}{2}$ hr. at 65° with a nickel spatula. E. LEWKOWITSCH.

Nutritive value of hardened oils. III. Influence of ultra-violet irradiation. S. UENO, M. YAMASHITA, and Y. OTA (J. Soc. Chem. Ind. Japan, 1930, 33, 61 B) .-The physical and chemical properties of hydrogenated sardine oil (m.p. 34·4-36°), herring oil (m.p. 39·8- $41\cdot3^{\circ}$), and cod-liver oil (m.p. $39\cdot1-41\cdot1^{\circ}$) are not appreciably affected by ultra-violet irradiation. Feeding CL. XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS. CL. XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Production of sulphonation products from polymerised fats or oils or the acids thereof. H. BERTSCH, Assr. to H. T. BÖHME A.-G. (U.S.P. 1,749,463, 4.3.30. Appl., 12.9.27. Ger., 8.7.26).—See B.P. 274,104; B., 1928, 613.

Organic acids and their salts (B.P. 324,538).— See III.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Rational and automatic fine-sieving of lake, oil, and protective paint colours. Asser (Chem. Fabr., 1930, 71-77).-The construction and operation of enclosed, self-operating, fine-sieving devices for paints are described. The apparatus consists essentially of a closed chamber divided into two compartments. In the first are coarse sieves of diminishing aperture, and in the second three or more fine sieves of the same dimensions. The latter are arranged like plates in a filter press, the paint flowing from both outer sides into the middle space, from which it leaves the apparatus. Means are provided for automatically removing skin and coarse particles arrested by the coarsest sieve in the first compartment. S. I. LEVY. 11997年初10月6日

Evaluation of the contrast-obliterating and brightening power of white pigments. G. S. HASLAM (Ind. Eng. Chem. [Anal.], 1930, 2, 69-72).-The terms "brightening power," " contrast ratio," and " contrast-obliterating power " are defined, the lastnamed being considered as the true definition of hiding power, avoiding confusion with tinting strength. It is shown that these two are not universally synonymous. The determination of the brightness over black glass of pigment-in-oil films of varying thickness, obtained by progressively spinning the films, is described and brightness-film thickness curves are drawn for the range "ultimate brightness" to "brightness of the black glass," from which it is shown to be possible to study the relationship between film thickness and brightness over any stated background. The results obtained with six common white pigments are given and the increase in hiding power with decrease in brightness is shown. It is considered that the value at which the eye is capable of detecting contrast is less than the generally accepted 98%. S. S. WOOLF.

PATENTS.

Zinc white. J. M. H. CORNILLAT (F.P. 632,235, 15.7.26).—Zinc is rapidly melted in a mazout flame and oxidised in an air-blast, the zinc oxide being collected in a chamber lined with linen. C. HOLLINS.

Coating of [smooth] surfaces [with lacquers]. BRIT. CELANESE, LTD. (B.P. 298,608, 2.10.28. U.S., 12.10.27).—Coating compositions containing cellulose acetate or other organic esters or ethers of cellulose and suitable plasticisers are caused to adhere to metallic, glass, wood, or other smooth surfaces by means of an intermediate nitrocellulose lacquer film, preferably thicker than the cellulose acetate film.

S. S. WOOLF.

Refining of rosin. (A, D) I. W. HUMPHREY, (B, C, F) H. E. KAISER and R. S. HANCOCK, (E) G. M. NORMAN, Assrs. to HERCULES POWDER Co. (U.S.P. 1,715,083–8, 28.5.29. Appl., [A] 28.7.26, [B] 18.8.26, [C] 18.8.26, [D] 23.8.26, [E] 25.9.26, [F] 8.6.28. Renewed [A, D, E] 7.12.28, [B] 8.8.28).—Colouring matters are removed from rosin by dissolving the rosin in mineral oil and extracting impurities with (A) aniline, (B) furfuryl alcohol, (C) furfuraldehyde, (D) ethylene chlorohydrin, (E) liquid sulphur dioxide, (F) any suitable organic solvent, such as (A) to (D) or phenol. C. HOLLINS.

Manufacture of artificial resins by condensation of phenols with aldehydes. G. A. LACROUX (F.P. 623,535, 17.8.26).—Phenol-aldehyde resins are treated with calcium carbonate and the mixture is neutralised with lactic acid. The product may also be treated with sodium thiosulphate; it is a white substance highly resistant to alkalis. Addition of lithopone gives the resin an ivory, citric acid a mottled ivory, and calcium chloride a mother-of-pearl appearance. Admixture with lead salts renders it impenetrable to X-rays. A. R. POWELL.

Manufacture of condensation products of phenols and formaldehyde. Soc. DES USINES CHIM. RHÔNE-POULENC, H. W. and P. O. HEREWARD, and E. F. EHRHARDT (B.P. 325,861, 3.9.28. Addn. to B.P. 321,697; B., 1930, 69).—The polyhydric phenols, *e.g.*, resorcinol, mentioned in the earlier patent are replaced by a mixture of poly- and mono-hydric phenols, with or without the addition of a catalyst. S. S. WOOLF.

[Production of urea-formaldehyde] synthetic resin. A. V. KELLER (B.P. 326,070, 19.4.29).—Urea or a derivative is condensed with formaldehyde or paraformaldehyde in the presence of a small proportion of copper sulphate, the greenish-blue colour of the intermediate condensation product being removed or reduced by chlorination or like bleaching means. Fillers, pigments, or dyes may be added if desired.

S. S. WOOLF.

Apparatus for manufacture of zinc white. J. M. H. CORNILLAT (U.S.P. 1,751,396, 18.3.30. Appl., 9.7.27. Fr., 15.7.26).—See F.P. 632,235; preceding.

Production of permanent [pigments for] paints. N. SPECHT, ASST. to DEUTS. GASGLÜHLICHT-AUER-GES. M.B.H. (U.S.P. 1,750,287, 11.3.30. Appl., 21.10.25. Ger., 31.10.24).—See B.P. 242,282; B., 1926, 955.

Manufacture of a solid resin from the semi-fluid resinous matter extracted from crude gutta-percha and/or balata. A. B. CRAVEN (U.S.P. 1,751,724, 25.3.30. Appl., 23.7.27. U.K., 1.1.27).—See B.P. 278,922; B., 1927, 948.

Production of alkyl esters of abietic acid. A. C. JOHNSTON, ASST. to HERCULES POWDER Co. (U.S.P. 1,749,482—3, 4.3.30. Appl., [A] 18.10.27, [B] 12.6.28).— See B.P. 298,972; B., 1930, 249.

Carbon black (B.P. 324,959 and 325,207).—See II. Titanium dioxide (U.S.P. 1,742,674).—See VII. Treatment of minerals (U.S.P. 1,742,191).—See X.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

Factory economies in the preparation of raw rubber. B. J. EATON (Rubber Res. Inst. Malaya, 1930, 1, 232—240).—The advantages of correlating the dimensions and capacity of the coagulating tanks,

sheeting rolls, and packing cases for smoked sheet rubber are indicated. Standardisation is also desirable in the smoking process for which, in Malaya, the wood required ranges from 1 to 10 lb. per lb. of rubber. Observations are also made on possible advantageous process modifications in the production of crêpe rubber. D. F. Twiss.

Some properties of sponge rubber. Anon. (U.S. Bur. Stand., 1929, Circ. No. 377, 8 pp.)-Thirteen samples of soft sponge rubber were examined as to weight per unit volume, hardness (load necessary for 40% compression), porosity (from shrinkage between plates with load of 4000 lb./in.²), tensile strength and elongation, permanent set after compression, buoyancy in water, hysteresis under slow compression and under impact, and thermal conductivity. A structure of closed pores was favourable to buoyancy in water and to small hysteresis loss under slow compression, but damping properties as revealed by hysteresis under impact appear to be independent of softness or hardness; for heat insulation a low percentage of solid material and the absence of the ordinary rubber fillers are desirable. Photographs are given showing the texture of the D. F. Twiss. samples.

Swelling of [rubber] latex. F. EVERS (Kautschuk, 1930, 6, 46-50).—Whereas the addition of benzene or similar rubber solvent to richly ammoniacal latex causes coagulation to a jelly-like mass, it is possible easily to extract the rubber from ammoniafree latex by such a solvent, particularly if the latex be first diluted. This difference in behaviour is attributed to the presence of the ammonia and the consequent formation of a distensible surface film between the two liquids. This view is confirmed by ordinary and microscopical examination of the latex during the action of the solvent. D. F. TWISS.

Sipalin as a softening agent in the rubber industry. E. WURM (Kautschuk, 1930, 6, 51-52; cf. Ditmar and Preusze, B., 1929, 949).—Sipalin AOM (methyl cyclohexyl adipate) is an advantageous softener for rubber; it enables the avoidance of excessive heating during mixing operations and the reduction of mastication periods. D. F. TWISS.

Ageing of vulcanised rubber. X. Relation between degree of oxidation of vulcanised rubber and occurrence of maximum acetone extract. T. YAMAZAKI and K. OKUYAMA (J. Soc. Chem. Ind. Japan, 1930, 33, 68—72 в).—With progressive ageing of vulcanised rubber at 70° or 90° the percentage extractable by acetone attains a maximum and then decreases. This is probably caused by gradual increase in the degree of oxidation with formation of acetoneinsoluble products. Samples which had been previously extracted with acetone were used for the experiments in order to expedite the ageing process, but evidence justifying this action is adduced. D. F. TWISS.

Mathematical representation of the deformation curve of rubber. M. KRÖGER and E. MÖBIUS (Gummi-Ztg., 1930, 44, 1153—1154, 1209—1212).—Various possible methods for mathematical formulation of the stress-strain curve of well-vulcanised rubber are compared, the small initial portion of the curve being disregarded. D. F. Twiss.

Measurement of the $p_{\rm H}$ value of rubber latex. J. E. MACKAY (India-rubber J., 1930, 79, 353).—Trial of the Wulfi colorimetric $p_{\rm H}$ tester with solutions of known hydrogen-ion content reveals certain ranges of $p_{\rm H}$ where the tester is not capable of giving exact results. Between $p_{\rm H}$ 6.0 and 12.0, however, which would include the values for alkaline latex, the usefulness of the tester is impaired only by a discontinuity at $p_{\rm H}$ 7.2—8.0. D. F. Twiss.

PATENTS.

Rubber-coated fabrics and the like. IMPERIAL CHEM. INDUSTRIES, LTD., Assees. of A. N. PARRETT (B.P. 299,321, 22.10.28. U.S., 22.10.27).—Rubberised fabrics or varnished rubberised fabrics are coated with a pyroxylin composition which has a good adhesion thereto, and has such extensibility and pliability that it will not substantially crack or peel when the material is flexed. For this purpose the pyroxylin composition contains a proportion of drying oil (blown or otherwise) at least equal to that of the pyroxylin. D. F. TWISS.

Manufacture of rubber articles. DUNLOP RUBBER Co., LTD., and (A) G. W. TROBRIDGE, (B) D. F. TWISS, F. T. PURKIS and E. A. MURPHY (B.P. [A] 324,006, 11.10.28, and [B] 324,104, 18.10.28).-(A) Ornamental articles, comprising at least two pieces of rubber of different colours integrally united with one another, are produced by providing a mould or former with a coloured coating of an aqueous dispersion of rubber and then applying to this a coating of an aqueous rubber dispersion of another colour. Alternatively, grooves, indentations, or embossed parts on the mould may be filled or covered with at least one coloured, aqueous, rubber dispersion, and the mould is then coated with a dispersion of another colour, e.g., by dipping, spreading, or electrodeposition. In either case the whole is dried and vulcanised. (B) Concentrated rubber latex, compounded or otherwise, is gelled by heating after the addition of one or more non-coagulating substances, which on rise of temperature yield acidic coagulants for latex; such additions are ammonium persulphate, mixtures of this with trioxymethylene or ammonium thiosulphate and mixtures of ammonium or barium thiosulphate with hydrogen peroxide, salts of per-acids, D. F. Twiss. or lead acetate.

Vulcanisation of natural or artificial rubber. I. G. FARBENIND. A.-G. (B.P. 308,275, 20.3.29. Ger., 20.3.28).—Mercaptobenzthiazoles carrying a 4-methoxyl group and preferably also a halogen substituent (e.g., 6-chloro-) are used as accelerators. The rubber shows improved properties compared with that vulcanised with the aid of mercaptobenzthiazole itself.

C. HOLLINS.

Manufacture of rubber [anti-ageing compounds]. GOODYEAR TIRE & RUBBER CO., Assees. of A. M. CLIFFORD (B.P. 307,013, 25.1.29. U.S., 1.3.28).—Arylaminobenzyl alcohols, e.g., p-anilino- and p- α - or β -naphthylamino-benzyl alcohols, have anti-ageing properties. C. HOLLINS.

Regeneration of rubber. M. GATTEFOSSÉ, and Soc. FRANÇ. DE PROD. AROMATIQUES (ANC. ETABL. GATTE-

FOSSÉ) (F.P. 636,641, 20.10.26).—The old rubber is heated with an ester of *cyclo*hexanol, *e.g.*, its acetate or butyrate, or with benzyl amyl ether. After removal of impurities, fillers, fibrous material, etc. by filtration or centrifuging, the rubber is precipitated by the addition of a non-solvent such as alcohol and, if necessary, is purified by dissolving in a rubber solvent.

D. F. Twiss.

Carbon black (B.P. 324,959 and 325,207). Lubricating oil (F.P. 636,242). Stabilised dispersions (B.P. 324,663).—See II.

XV.—LEATHER; GLUE.

Red discoloration of salted hides and salt stains. M. BERGMANN (J. Soc. Leather Trades' Chem., 1929, 13, 599-611).-Salt-cured hides and skins frequently show large surfaces discoloured pink to brick-red on the flesh side. The hair is looser on the grain side of such skins than on skins which are free from such discoloration. The stains spread to other skins by contact. It is seen by microscopical examination that the layer of connective tissue containing thick deposits of fat beneath the corium in healthy skins is largely destroyed in discoloured skins and filled with bacteria, bacilli, and globulets. The damage is found on the flesh side only in the early stages, but later the epidermis may be destroyed and the hair loosened. Sarcina lutea and auriantica, Micrococcus roseus and tetragenus, varieties of Proteus and Actinomyces, and B. subtilis have been identified in the stained portions. M. tetragenus and the Actinomyces decompose fat and the others liquefy gelatin. A number of them show pronounced coloration. The growth of S. auriantica and of the Actinomyces is hindered by the presence of sodium chloride, but is not prevented by 2-4% of the salt, so that these two species can only develop in poorly-salted parts of the hide. Increased growth of S. lutea and M. roseus is observed with increase in salt content up to 8%, so that these develop on well-salted hides if the latter become warm and moist. The development of these bacteria is only partially checked by increasing the alkalinity to PH 9. More skin substance is lost by red, discoloured, salted calf-skins during soaking than by healthy skins. Patchy dyeing is shown by red discoloured skins owing to the altered absorptive power of the discoloured parts; the fat absorption and finishing are also affected. Small light yellow, orange, or dark blue spots have recently been observed on the grain of salted skins; usually several stains together are accompanied by hard rough contractions containing calcium phosphate and sulphate. A number of gelatin-liquefying organisms have been isolated which are present in air, soil, or water, the growth of which is not checked by the presence of 4% of salt. To prevent their growth, the hide should be washed immediately after flaying to remove blood, dung, lymph, etc., brined with salt free from iron and containing a minimum of gypsum or other sulphates, and stored in a cool room which is not too moist.

D. WOODROFFE.

Preparation of hide powder. R. TATARSKAJA (Collegium, 1929, 644-651).—Heavy hides are soaked for 24-48 hrs., limed first for 11 days in a saturated lime liquor containing 0.1% of sodium sulphide and then for 3 days in a lime liquor alone, unhaired, split so as to remove the layers on flesh and grain sides (which contain the elastin), and the middle layer of collagen is treated with a solution of sodium chloride to remove soluble proteins. The product is then delimed with hydrochloric acid and ammonium chloride, reduced to $p_{\rm H}$ 5.0-5.5 with acetic acid solution, washed, dehydrated with alcohol, and ground. To minimise the increased swelling properties, such pelt may be chromed or treated with 0.01% solutions of formaldehyde or with lead acetate before washing, dehydration, and grinding. The adsorptive properties of the powder in weak tannin solutions of analytical strength are not affected by this treatment, but they are diminished in stronger solutions. The hide powder takes up about 50% of the acid non-tans present in solutions of analytical strength. This is increased by suitable pretreatment with alkali. Vigorous shaking of the powder with alkali reduces its nitrogen content and causes partial gelatinisation. The powder must not be shaken vigorously with either acids or alkali and the temperature must not be raised. D. WOODROFFE.

Fractional peptisation of vegetable tan liquors. N. KOTELNIKOV and J. BASS (Collegium, 1929, 637-643). -Solutions of different tanning materials (mimosa, myrobalans, willow bark, and badan) are precipitated with 1:1, 1:2, and 1:8 solutions of sodium chloride, respectively, filtered through a Schott glass filter, and washed with the respective precipitating solution until the filtrate is free from colour and gives no reaction with ferric chloride. The precipitate is washed with hot water into a flask, and the sodium chloride, insoluble matter, and total solids are determined in it, from which figures the tannin content is deduced. Stiasny's method (B., 1924, 105) of determining the amount of tannin salted out is criticised. The smallest percentages of total tannin salted out by the 1:1 and 1:8 salt solutions were obtained with valonia, which indicates that it is the most stable tannin. By similar tests on actual tannery liquors composed of mimosa, mangrove, and quebracho extracts it is shown that the stability increases the longer the liquors have been in use. Freshly-prepared willowbark liquors, extracted with hot water, are found to contain a large amount of very unstable tannins and consequently should not be used in the early stages of tannin without previous artificial stabilisation. Mimosa bark was extracted with three lots of liquor, and each liquor was tested by the above precipitation method. The most stable tannin was the first extracted, and was the first to be absorbed by the pelt, whilst the stability of the extracted fractions diminished in the order of their extraction. The amount precipitated by salt solutions from dry residues was greater than that from coagu-D. WOODROFFE. lates.

Examples of fluorescence applied to the qualitative analysis of tannins. G. DESMURS (J. Soc. Leather Trades' Chem., 1929, 13, 616—624).—Mulhouse and calico strips each weighing 1 g. are immersed in 350 c.c. of a solution of the tanning material of analytical strength and the liquid is heated to boiling for 15 min. The Mulhouse strip is then removed, washed,

and dried, but the calico strip is left in the solution for 12 hrs., treated with a mixture of 350 c.c. of distilled water, 25 c.c. of a 0.2% solution of tartar emetic, and 25 c.c. of a 0.1% solution of sodium acetate for 15 min., washed in distilled water, and dried. The calico strip can be treated with a pure product which it is desired to identify, e.g., with fustic when seeking to detect fisetin, or with a good pine-bark extract when examining the violet fluorescence. A yellow fluorescence is observed when strips treated with quebracho, tizerah, urunday, algarobbo wood, berberry, Japanese coptis, and Colombo root are examined by a Wood light, and a faint yellow with hemlock, mimosa, and true cutch. All these materials can be identified by the Mulhouse strips except quebracho and tizerah, the colours with which are confused. Violet fluorescence is shown by pine bark, malet, quassia wood, guaiacum, and quillaia bark. A bluish fluorescence was obtained with French turpentine and an alcoholic solution of colophony, garouille, canaigre, and badan. Algarobbo extract, mimosa, and cutch can be differentiated from algarobilla, malet, and gambier extracts, respectively, by the violet fluorescence manifested by the last three. Synthetic tannins derived from naphthalene or anthracene nuclei show a deep violet fluorescence, quinol a pale violet, and phloroglucinol a sky-blue. A white fluorescence is given by orchil, alkanet, a mixture of quebracho or tizerah and pine-bark extracts, mixtures of mimosa with a pyrogallol tannin or urunday. D. WOODROFFE.

PATENTS.

Treatment of hides. D. L. LEVY (U.S.P. 1,742,514, 7.1.30. Appl., 20.5.27).—Hides are tanned, stretched on frames, tanned in the stretched condition with a liquor containing common salt, and afterwards fat-liquored in a drum with a fat-liquor containing glycerin.

D. WOODROFFE.

Tanning of animal hides. I. G. FARBENIND. A.-G., Assess. of K. DACHLAUER and C. THOMSEN (G.P. 453,477, 11.3.25).—The pelts are treated with the condensation products of one or more halogenated ketones, ethers, or aldehydes with an aromatic hydroxy-compound which have been rendered water-soluble by sulphonation or other treatment. *E.g.*, the sulphonated compounds prepared according to G.P. 453,430 may be neutralised with 10-20% sodium hydroxide or with acetic acid (in the case of those condensation products which have been made soluble by treatment with formaldehyde and alkali sulphite) and the resulting solution, if necessary, after addition of synthetic or natural tanning materials, is used for steeping the pelts. A. R. POWELL.

•Emulsion [for tanning purposes]. О. Вёнм (U.S.P. 1,751,217, 18.3.30. Appl., 5.10.27. Ger., 13.11.26).—See В.Р. 280,509; В., 1928, 651.

Tanning of hides and skins. E. G. STIASNY and B. J. JALOWZER (U.S.P. 1,749,724, 4.3.30. Appl., 3.1.27. Ger., 30.11.25).—See B.P. 287,221; B., 1928, 420.

Condensation products (B.P. 321,190) .-- See III.

XVI.—AGRICULTURE.

Determination of the phosphoric acid requirement of soils. A. DEMOLON and G. BARBIER (Compt. rend., 1930, 190, 765-767; cf. B., 1930, 254).—The critical equilibrium constant (number of mg. of P_2O_5 per litre which for the acid used for extraction, and a given soil, does not cause any exchange of P_2O_5 between the two phases) has been determined for 22 soils, using 1% acetic acid (by vol.) containing varying amounts of ammonium dihydrogen phosphate (cf. *loc. cit.*). The constant varies from 0.36 to 156, and those soils with a constant greater than 30 have a phosphoric acid content requisite to the needs of crops grown in them. H. BURTON.

Emulsifying powers of bentonite and allied clays, and of clays derived from these by base exchange and by hydrolysis. R. M. WOODMAN and E. McK. TAYLOR (J. Physical Chem., 1930, 34, 299-325; cf. B., 1929, 730).-Clay-containing substances of different kinds and sources, and derivatives prepared from them by base exchange or by hydrolysis, give both water-in-oil and oil-in-water types of emulsions with fatty acids, oils containing these acids, and with phenols and hydrogenated phenols. This is considered to be due to interaction of the fatty acids etc. with sodium and calcium hydroxides resulting from hydrolysis of the clay or with decomposition products of the clay; the emulsifier is thus changed and soaps are introduced. Clays, as such, are not responsible for dual emulsification. Clays of all kinds are unsuitable as emulsifiers in the preparation of spraying emulsions containing free fatty acids, fixed oils, or phenols owing to the possible formation of the undesirable water-in-oil type of emulsion. A lignitic clay gave water-in-oil emulsions with fatty acids and fixed oils, and the suspended material was completely withdrawn from the aqueous phase.

L. S. THEOBALD.

Plant nutrition. II. Effect of manurial deficiency on the mechanical strength of barley straw. F. R. TUBBS (Ann. Bot., 1930, 44, 147—160).—Nitrogen and phosphorus deficiency results in a large increase in the strength of the lower internodes of barley straw, whilst potassium starvation decreases the strength of the lower and increases that of the middle internodes. Various morphological features of the straws have been measured and correlated with the mechanical strength. W. O. KERMACK.

Mutual physiological replacement of calcium and potassium. H. LAGATU and L. MAUME (Compt. rend., 1930, 190, 389—391).—" Royal Kidney" potatoes grown in calcarcous soil produce leaves which are richer in calcium than in potassium, even when supplied with a complete artificial manure. The predominance of calcium, not particularly marked in early May, increases until at the end of July it is nearly 500%. In potatoes grown in non-calcareous soil the potassium of the leaves predominates at the end of June, and by the middle of August is approximately equal in amount to that of the calcium. With complete artificial manuring the early predominance of potassium is increased, but falls off more rapidly until calcium again predominates.

P. G. MARSHALL.

Influence of humus substances on the growth of green plants in water cultures. C. OLSEN (Compt. rend. Trav. Lab. Carlsberg, 1930, 18, No. 1, 16 pp.).— The addition of humus extracts to water cultures of plants increased growth by the introduction of iron compounds in a condition not precipitable at the $p_{\rm H}$ values obtaining in the experiment. Ferric citrate had a similar action. When iron was supplied to the cultures as ferric chloride precipitation of ferric hydroxide occurred in slightly acid, neutral, and alkaline conditions and plant growth was limited by the iron deficiency. The activity of "bacterised" peat (Bottomley) is ascribed to such an effect and not to the presence in it of "auximones." A. G. POLLARD.

Magnesium and calcium requirements of the tobacco crop. W. W. GARNER, J. E. MCMURTREY, JUN., J. D. BOWLING, JUN., and E. G. Moss (J. Agric. Res., 1930, 40, 145-168).-The application of the newer highly concentrated fertilisers in place of the old bulky types containing fillers to tobacco grown in light sandy and sandy loam soils is leading to symptoms of magnesium and calcium deficiency. Addition of small amounts of magnesium salts alone to fertilisers may lead to toxic effects, preventable by adding lime. Magnesium hunger, or "sand drown," is characterised by a breakdown of both green and yellow pigments in the leaves, accompanied by a decrease in leaf size, and of dry matter and carbohydrates per unit of leaf area. A minimum of 0.25% of magnesium is required in the leaf to prevent deficiency symptoms, which on the basis of a crop of 1000 lb. of leaf and 500 lb. of stalk represents a removal of 3.75 lb. of magnesium per acre. Practical experience shows, however, that 12-18 lb. of water-soluble magnesium per acre is a useful application, and any toxic effect of magnesium salts by themselves may be prevented by the use of dolomitic limestone at the rate of 500-1000 lb. per acre.

E. HOLMES.

Influence of osmotic pressure on the growth, transpiration, and storage of ash in tobacco. E. M. KALITAEVA (U.S.S.R. State Inst. Tobacco Invest., 1929, Bull. 62, 26 pp.).—Oriental tobacco plants ("Varatik") grown in water culture exhibit the maximal growth of tops when the osmotic pressure of the nutrient solution is 1.75 atm. and of the roots is 0.1 atm. The ash content of tobacco leaves increases with increase in the concentration of the nutrient solution. The optimum concentration of calcium to magnesium for the growth of the plant is 1:16. With increasing concentration of the nutrient solution the calcium content of the leaves tends to decrease, whilst the magnesium content remains approximately constant. Roots, stems, leaves, and flowers have an acid reaction. W. O. KERMACK.

Synthesis of ammonia by soil Azotobacter. S. WINOGRADSKY (Compt. rend., 1930, 190, 661—665).— Ammonia is evolved in appreciable quantities from cultures of soil Azotobacter grown on silica gel or gelose impregnated with sodium lactate or succinate (cf. Kostytschev and Ryskaltchouk, A., 1925, i, 1014). The evolution is a function of the alkalinity produced in the medium by the organism, since it is apparent only above $p_{\rm H}$ 9 and does not occur in the presence of calcium salts. Its bearing on the hypothesis of the bacterial hydrogenation of nitrogen is discussed.

J. GRANT. Evaluation of calcareous mixtures used in. agriculture. LENGLEN and DURIER (Compt. rend., 435

1930, 190, 391—393).—The method is based on the solubility of pure calcium carbonate in carbonic acid. A quantity of calcareous matter equivalent to 0.20 g. CaCO₃ is agitated with 500 c.c. of water containing 0.8 g. CO₂ for 2 hrs. at 15°. After filtration the filtrate is titrated with 0.1N-sulphuric acid, using Orange III as indicator. The solubility varies within wide limits according to physical structure for particles of equal size, and enables the products to be classed as hard, semi-hard, or soft. Solubility can therefore be used as a criterion of the value of different samples.

P. G. MARSHALL.

Corrosion of lead by soils. BURNS and SALLEY.— See X.

PATENTS.

Fertiliser. H. H. MEYERS, ASST. to ARMOUR FERTILIZER WORKS (U.S.P. 1,742,448, 7.1.30. Appl., 29.4.26).—A mixture of oxides of nitrogen (produced, e.g., by the catalytic oxidation of ammonia) with an excess of air is brought into contact, e.g., in towers, with phosphoric acid, and the mixture of nitric and phosphoric acids obtained is neutralised with ammonia; the product on evaporation yields a fertiliser of low hygroscopicity and containing, e.g., N 19.5—21.7% and P_2O_5 38.5—36.0%. L. A. COLES.

Production of fertilisers. STOCKHOLMS SUPERFOSFAT FABRIKS AKTIEBOLAGET (B.P. 306,103, 15.2.29. Swed., 15.2.28).—Raw phosphatic material is treated with a mixture of sulphuric and nitric acids in proportion such that, on subsequent treatment of the product with ammonium carbonate, or with ammonia and carbon dioxide, the solution contains $(NH_4)_2SO_4$: $NH_4NO_3::1:2$. If desired, part of the sulphuric acid may be replaced by an equivalent weight of ammonium sulphate, and alkali sulphates may be added to the material to prevent too high a rise in temperature. After filtration to remove the insoluble constituents, which contain a high proportion of citrate-soluble phosphates, the solution is evaporated to dryness, yielding a residue containing ammonium sulphate nitrate, (NH₄)₂SO₄,2NH₄NO₃, which may be used as a fertiliser alone or in admixture with the L. A. Coles. phosphatic material.

Manufacture of soluble phosphatic fertilisers from tricalcium phosphates. J. A. POND (B.P. 300,965, 17.11.28. N.Z., 21.11.27).—Finely-ground phosphatic material, e.g., Nauru guano, is treated below about 140° in an air-tight rotating container with sufficient sulphuric acid, $d \cdot 36$ —1 · 7, to convert the tricalcium phosphate almost entirely into mono- and di-calcium phosphates. During the heating, which is continued until the mixture is dry, the vapours and moisture evolved are withdrawn from the container by suction and/or by the introduction of heated air under pressure. L. A. COLES.

XVII.—SUGARS; STARCHES; GUMS.

The sugar palm. J. N. MILSUM and J. H. DENNETT (Malayan Agric. J., 1929, 17, 449-453).—Two samples of juice from 7-year-old sugar palms, *Arenga saccharifera*, Labill., contained, on the average, 6% of sucrose,

0.13% of invert sugar, 0.25% of carbohydrates not sugars, 0.005% N, 0.020% of ash, and had d^{29} 1.0315 and 1.0200. E. HOLMES.

Ash of Nipa [palm] juice and its preservation, using alcohol and heat as sterilising agents and copper sulphate and lime as preservatives. J. H. DENNETT (Malayan Agric. J., 1929, 17, 437-448; cf. B., 1928, 313).-Nipa juice from cultivated palms contained 0.036% N and 0.630% of total ash as compared with 0.047% and 0.575%, respectively, in juice from indigenous palms. The ash of the former contained more potash, viz., 0.277% as against 0.183%, less sulphates and magnesia, and approximately the same amounts of phosphoric acid, chlorides, and iron, aluminium, and calcium oxides than that of the indigenous palms. Fermentation and inversion of juice is largely inhibited by washing the collecting cups with 95% alcohol containing 0.6-1% of copper acetate or sulphate, and collecting at 12-hr. intervals. Lime at the rate of about 8 g. E. HOLMES. per litre of juice is also effective.

Manufacture of sugar from nipa sap. M. L. Roxas (Philippine J. Sci., 1929, 40, 185-229).-As a source of sugar the nipa palm (Nypa fruticans, Wurmb.) has several advantages over the sugar cane, as the juice is obtained without milling and is free from invert sugar when it leaves the plant. The collection of the juice, however, necessitates much more field labour than the sugar cane requires, and it has not been found practicable to prevent considerable deterioration of the sap during its collection. The best preservative for the sap is a condition of strong alkalinity, and the author describes various attempts to ensure that the sap is rendered alkaline as it drips from the cut stem into the attached receptacle, which is usually a bamboo tube. The method provisionally adopted was to coat the interior of the tube with milk of lime, mixed with sodium bisulphite in some cases. The yield of sap per tree per day is about 1 litre, and the yield per hectare of nipa swamp is about 30,000 litres in a season of 90 days. A factory working 100 tons of sap per day would require about 1000 natives collecting from 400 hectares, besides 100 men in the factory itself. In an experimental factory plant sugar of 97.4 polarisation was produced from sap containing 12.5% of sugar, after liming and carbonatation; but very heavy liming was necessary, corresponding to 27 c.c. of 0.2N-alkali per 10 c.c. of sap. With addition of a bone-char filter, about 70% of the sugar in the sap could be obtained as white sugar of 99% polarisation. It is concluded that in spite of the heavy requirements of lime (for collection and purification of the sap) and the necessity of employing wood instead of bagasse as fuel, sugar can be produced from the nipa palm at a reasonable profit. J. H. LANE.

Starch slime. SPROCKHOFF (Z. Spiritusind., 1930, 53, 78–79).—From 10 to 15% of the starch output is lost in the form of starch refuse or slime, which consists of about 50% of very minute starch granules mixed with traces of proteins, fibre, iron, bacteria, etc. The formation of the waste is chiefly due to the prolonged exposure of the slow-settling starch grains to the attack of bacteria and enzymes. By their agency the protein is converted into a gelatinous material which covers

the surface of the starch grains and prevents their rapid separation. The amount of waste may be reduced to about 2% if the separation is speeded up by replacing the settling tanks with centrifuges, and by assisting more rapid separation of the starch by treatment of the starch paste in the final stage of manufacture with sodium hypochlorite. The sodium hypochlorite, which replaces the customary alkali and acid, removes the gelatinous protein coating more rapidly and also accelerates the separation of the grains from the liquid. C. RANKEN.

Tenacity of large and small granules of potato starch. SPROCKHOFF and PARLOW (Z. Spiritusind., 1930, 53, 62-64).—The viscosity, and consequently the tenacity, of starch pastes made from potato starch with very small granules is greater than that where the starch granules are large, provided the more finelydivided starch flour has been rapidly manufactured and is fresh. The inferior tenacity of smaller-grained starch found in practice is due to the longer treatment required for its preparation and separation. Not only is a more prolonged enzymic action permitted to take place at the surface, but the smaller starch granules offer a relatively greater surface area for the attack.

C. RANKEN.

PATENTS.

Ultrafine, soft, granulated sucrose sugar. B. H. VARNAU and T. B. WAYNE (U.S.P. 1,751,298, 18.3.30. Appl., 23.7.27).—See B.P. 294,800; B., 1928, 832.

Manufacture of dextrose. W. B. NEWKIRK, Assr. to INTERNAT. PATENTS DEVELOPMENT Co. (U.S.P. 1,750,939, 18.3.30. Appl., 17.1.25).—See B.P. 254,729; B., 1927, 122.

Grinding of gummy materials etc. (U.S.P. 1,739,761). Digestors (B.P. 325,760).—See I. Alcohol from starch (Austral.P. 6187).—See XVIII. Explosive (U.S.P. 1,741,146).—See XXII.

XVIII.—FERMENTATION INDUSTRIES.

Use of potato flakes in the manufacture of alcohol. KILP (Z. Spiritusind., 1930, 53, 71).— Optimum fermentation and the highest yield of alcohol are obtained by running the potato flakes very slowly into the water heated in the mash tun to 50—55°, and by keeping the mash in rapid motion by an efficient stirrer (80—90 r.p.m.). "Balling" and the subsequent necessity to raise the mash to 78—80° are avoided.

C. RANKEN.

Boulard's process for arresting fermentation at a desired stage. C. SCHWEIZER (Mitt. Geb. Lebensm. Hyg., 1929, 20, 30—34).—As found by Malvezin (B., 1927, 612), "immunisation" of grape juice against Saccharomyces ellipsoideus by Boulard's method (A., 1926, 867) does not protect the material against other micro-organisms. W. J. BOYD.

Fusel oil obtained in the form of vapour. B. LAMPE (Z. Spiritusind., 1930, 53, 62; cf. B., 1929, 619).—Fusel oil which has been separated in the form of vapour instead of by the usual method showed a slightly lower content of amyl alcohol. In the three samples dealt with the amyl alcohol amounted to 50.2, 49.6, and 40%, whereas from the normally separated fusel oil the maximum and minimum amounts of amyl alcohol were 64 and 50%, respectively. When the fusel oils which were separated in the form of vapour were fractionated, the fraction collected up to $90-91^{\circ}$ was very much greater than with the normally obtained oils. In addition, none of the oils so obtained was able to satisfy the official requirements, which demand that when 100 c.c. are distilled less than 30 c.c. shall distil under 100°, less than 50 c.c. under 120°, and at least 90 c.c. under 130°. C. RANKEN.

PATENTS.

Manufacture of malt. O. SLEEMAN (B.P. 325,495, 19.11.28).—The malt house is divided into superimposed compartments by means of several perforated floors so hinged that they permit the even dropping of the grain from floor to floor. Air may be admitted into, or exhausted from, any or all of the compartments. A water sprinkler is provided for moving over and sprinkling the grain on each of the upper floors.

C. RANKEN.

Recovery of enzymes. J. Y. JOHNSON. From I. G. FARBENIND. A.-G. (B.P. 325,831, 28.11.28).— Enzymes, such as the enzymes of rubber latex, blood, milk, etc., are separated from combined albuminous substances by degrading the albumin present by means of other enzymes, such as papayotin, which do not attack the desired enzymes under the conditions of working. The $p_{\rm H}$ of the solution should be adjusted to $6\cdot8-5\cdot0$. The products obtained may be purified by dialysis or by selective adsorption. C. RANKEN.

Apparatus for production of alcohol from substances containing starch. N. SACHOULIS (Austral.P. 6187, 28.2.27).—Starchy material is stirred for 1 hr. with warm 1% hydrochloric acid and then sterilised in a boiler into which steam and filtered air are blown. The mash is cooled to 40° and saccharified by inoculation with a fungus culture previously grown in rice flour with added aromatic substances, *e.g.*, sage. The mash is then fermented with yeast in a large vessel and subsequently in four small closed vessels, and the alcohol obtained by distillation and rectification.

C. RANKEN.

Denaturing agents for alcohol. I. G. FARBENIND. A.-G. (B.P. 298,617, 12.10.28. Ger., 12.10.27. Addn. to B.P. 298,611; B., 1930, 119).—Neutral substances, e.g., ethyl or acetyl sulphide, acetonitrile, ethyl thioacetate or thiobutyrate, are added to alcohol in addition to the agents described previously. L. A. COLES.

Manufacture of yeast. K. A. JACOBSEN, ASST. to STANDARD BRANDS, INC. (U.S.P. 1,752,003, 25.3.30. Appl., 28.5.28. Denm., 8.6.27).—See B.P. 291,770; B., 1929, 262.

Sterilisation of liquids (B.P. 325,796).—See XXIII.

XIX.-FOODS.

Factors influencing the value of wheat in baking. SCHRIBAUX (Compt. rend., 1930, 190, 689-691).— The value of a sample of wheat for bread-making is a function of the gluten content, and as a rough guide to this the percentage of nitrogen is determined. It is concluded that the variety of wheat is the most important factor and the climate the next. The mode of culture, particularly when nitrogenous fertilisers are used, affects the quantity but not the quality of the crop.

H. A. PIGGOTT.

Bleaching of flour. C. SCHWEIZER (Mitt. Geb. Lebensm. Hyg., 1928, 19, 223-235).—A résumé of the literature on bleaching of flour. W. J. BOYD.

Detection of rye flour in wheaten flour. C. SCHWEIZER (Mitt. Geb. Lebensm. Hyg., 1929, 20, 119—122).—The method of Tillmans and co-workers (B., 1929, 70) is more sensitive than that of Geilinger and Schweizer (Mitt. Geb. Lebensm. Hyg., 1925, 16, 95). W. J. BOYD.

Comparative sucrose determinations in sweetened condensed milk. A. DÜRING (Pharm. Zentr., 1930, 71, 49-51).—Comparison of the official method (Röttger, 1926, vol. 1, 5th ed., 407) with the modified method described below showed the latter to be the more rapid, convenient, and accurate. The condensed milk (10 g.) is mixed with 60 c.c. of hot water and treated with a suspension of 1 g. of calcium oxide in a little water. The mixture is shaken, heated on the water-bath at 80° for 1 hr., cooled, and treated successively with 10 c.c. of dilute sulphuric acid (1:4), 5 c.c. of lead acetate, and 5 c.c. of saturated sodium phosphate solution. After the precipitate has settled, the liquid is filtered by suction through a porcelain funnel covered with cloth and a thin layer of asbestos, and the residue on the filter is washed until free from acid. The filtrate is made up to 200 c.c., treated with 0.5 g. of ignited charcoal powder, and again filtered. The rotation of the solution in a 200-mm. tube at 20° (measured in the Laurent polarimeter) multiplied by 15 gives the weight W. J. BOYD. of sucrose in 100 g. of sample.

The Vieth ratio [in determination of dried milk.] F. E. NOTTEOHM (Z. Unters. Lebensm., 1929, 58, 300– 310).—Analyses of numerous samples of sound milk from lowland cattle both mixed and from single animals show that the Vieth ratio, lactose : protein : ash = 13:9:2, is the correct one. Analyses of samples of condensed and dried milk confirm this. Vieth's formula is also applicable to milk throughout lactation, except for 10—14 days at the beginning and for 4 weeks at the end of the period. For milk unsound through disease or bacterial infection a more correct ratio is found to be lactose : protein = 13:10. W. J. BOYD.

Milk of the silver fox. O. LAXA (Ann. Falsif., 1929, 22, 598-600).—A method is given for the determination of the important constituents of milk on 8 g. of material. The result of the analysis shows that the milk of the fox is very rich in fat $(12 \cdot 25\%)$, saponif. value 208) and protein (casein $9 \cdot 15\%$, albumin and globulin $7 \cdot 89\%$), and contains less lactose than cows' milk. The proportion of Vieth for protein, sugar, and ash gives the values $18 \cdot 8 : 4 \cdot 3 : 1 \cdot 6$ for foxes' milk as compared with $17 \cdot 7 : 5 \cdot 6 : 1 \cdot 6$ for dogs' milk.

A. SHORE.

Biochemistry of cheese ripening. C. BARTHEL (Svensk Kem. Tidskr., 1930, 42, 28–40).—The biochemical processes which take place in cheese during its ripening are discussed. An improved method has

been devised in connexion with the nitrogen determinations used in following the changes. The cheese is mixed with quartz sand of grain size 0.3-0.1 mm. in the proportion of 1:2, and the mass pressed to expel the liquid portion; the nitrogen content of the expressed fluid is determined, and the result given as a percentage of the total nitrogen present in the cheese. The figures obtained give a more satisfactory series in experimental work than those resulting from the usual determination of nitrogen in an aqueous extract of the cheese. Using the above method, the effect of the salt content of cheese has been investigated, and the results are tabulated. Even small amounts of salt exert a marked influence on the hydrolysis of the paracasein; furthermore, the hydrolysis of the cheese constituents and the content of lactic acid bacteria appear to bear a direct relationship to one another. H. F. HARWOOD.

Margarine containing egg-yolk. E. VOLLHASE, H. J. STEINBECK, and E. DANIELSEN (Z. Unters. Lebensm., 1929, 58, 342-352) .- The following modification of Fendler's method of detecting egg-yolk in margarine (ibid., 1903, 6, 977) is recommended. 200 G. of margarine are melted at 50-60° and shaken at intervals during 15 min. with 100 c.c. of 2% salt solution also at 50-60°. The aqueous layer is separated, well cooled, and filtered. The clear filtrate (50 c.c.) is shaken with 8 c.c. of ether. If liquid egg-yolk is present the ether is coloured yellow; 0.25% of yolk in margarine gives, under these conditions, a coloration in the ether equal to that of a freshly prepared aqueous 0.0005% picric acid solution. In testing for dried egg-yolk the melted margarine is filtered and the filter is cut up and extracted with ether. The insoluble material is filtered off, washed with ether, dried, and extracted with 2% salt solution. The filtered extract is shaken with 8 c.c. of ether. (The melted margarine can be extracted directly with distilled water as it already contains sufficient salt.) As before, a yellow coloration of the ether indicates the presence of egg-yolk. A biological (precipitin) method of detecting 0.25% of egg-yolk in margarine, using only 50-100 g. of sample, is described. This is equally applicable for dried or liquid yolk. W. J. BOYD.

Bacterial detection of foreign honey. C. SCHWEI-ZER (Mitt. Geb. Lebensm. Hyg., 1928, 19, 117—125). Honey, although acid in reaction, is liable to bacterial infection. Unheated honey may be free from bacteria. Strong bacterial infection indicates unhygienic conditions of production. Bacterial examination gives no reliable indication of the country of origin. W. J. BOYD.

Purification and determination of pectin. G. SPENCER (J. Physical Chem., 1930, 34, 429–434).— The purification of pectin by reprecipitation by alcohol, electrodialysis, and washing by decantation with acidified alcohol is described. The second method is the least, and the last the most, satisfactory. By the decantation method the ash content was reduced to 0.108%. An apparatus for electrodialysis is described. The chief constituents of the ash left after purification are silicon and aluminium. The determination of pectin is discussed briefly. L. S. THEOBALD.

Experiments with heat-precipitated horse-flesh

protein as precipitogen. C. SCHWEIZER (Mitt. Geb. Lebensm., Hgy., 1929, 20, 69—76).—Although Rosenberg's method (Centr. Bakt., 1924, 91, 318) of identifying boiled horse-flesh by the precipitin reaction, using boiled material for preparation of the antigen, has a scientific basis, its adoption in food analysts' laboratories is not recommended because of the unspecific, although less intense, reactions which the antiserum gives with extracts of the boiled flesh of other animals. The Rosenberg antiserum does not give better results than the ordinary Uhlenbuth antiserum.

W. J. BOYD.

Utilisation of blood. H. LÜTHJE (Chem.-Ztg., 1930, 54, 85—86).—The simplest method of utilising blood from a small slaughterhouse is by converting it into "blood-meal" in a jacketed cylindrical dryer, for which purpose it need not be defibrinated. On a rather larger scale a better return is obtained by making "watersoluble blood-powder" by atomisation of defibrinated blood in a hot-air dryer. The product should be 95% soluble in water. C. IRWIN.

Abnormal taste and odour of preserved foods. G. BIDAULT and G. HINARD (Ann. Falsif., 1930, 23, 30-36).-These abnormal qualities of preserved food do not depend on the material preserved, but, though they may arise from various causes, are in the majority of cases due to the bad quality of the material forming the airtight joint. The smell of petrol arises from the use of defective gums, or notably from regenerated rubber when a devulcanising process has been used, and may also be due to rubber substitutes, where petrol, heavy oil, paraffin, vaseline, etc. have been used in their production. In some cases the odour may arise from defects in fixing the cover. Insufficient tinning of the receptacle may cause blackening of certain foods and facilitates attack of the iron by acid juices. Certain indefinite odours are regarded as due to accidental contamination of containers with dirt.

D. G. HEWER.

Use of the Mojonnier milk tester for the routine determination of vanillin. Towt lead number. L. V. Towr (J. Dairy Sci., 1929, 12, 469-472).-The extract (25 c.c.) and water (10 c.c.) are evaporated at 60° to 25 c.c., the evaporation being repeated after addition of 10 c.c. of water. The residue, in an 18-g. cream-test bottle calibrated to 50 c.c., is treated with 4 drops of glacial acetic acid, shaken, then treated with 10 c.c. of standard lead acetate solution, diluted to the Of mark, shaken, corked, and centrifuged for 5 min. the clear liquid 25 c.c. are placed in a fat-flask, and extracted with 60 c.c. of ether in three portions, centrifuging as in a test for fat. The ethereal extracts are evaporated at 55°, the residue being dried over sulphuric acid and weighed. The remainder is diluted to the 45-mark, corked, shaken, centrifuged, and the level of the lead precipitate, which is proportional to the lead CHEMICAL ABSTRACTS. number, is observed.

Hardened oils .- UENO and others .- See XII.

PATENTS.

Treatment of coffee. D. J. KENNEDY (B.P. 325,468, 30.11.28. Cf. B.P. 325,039; B., 1930, 347).—The green

berries are steeped in citric acid solution for about 72 hrs. prior to roasting. L. A. Coles.

[Apparatus for] making bread. J. E. WILSON, S. MCCONNELL, and C. BROWN (B.P. 326,358, 18.3.29).

Freezing and storing fish. GOVERNOR & CO. OF ADVENTURERS OF ENGLAND TRADING INTO HUDSON'S BAY, and C. TOWNSEND (B.P. 325,947, 16.1.29).

Saturating and filling plants [for beverages]. C. WINTERWERB (B.P. 326,410, 17.5.29).

XX. - MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Percolation of alcoholic extracts; rational preparation of ergot extract. H. BREDDIN (Pharm. Ztg., 1930, 75, 336—337).—A method is described for preparing concentrated extracts by percolation, which is simple, economical in solvent, and gives a better exhaustion of the drug than the official procedure. Full details are given for obtaining ergot extract by this method. H. E. F. NOTTON.

Manufacture of diethylbarbituric acid. J. SCHWYZER (Pharm. Ztg., 1930, 75, 337—340).—Working details on a 10—20-kg. scale are given for the conversion of chloroacetic acid into ethyl malonate, ethyl diethylmalonate, and diethylbarbituric acid, and for the preparation of carbamide from calcium cyanamide.

H. E. F. NOTTON.

Standardisation and stabilisation of veratrum preparations and the hydrogen-ion concentration factor. VI. E. E. Swanson and C. C. HARGREAVES (J. Amer. Pharm. Assoc., 1930, 19, 122-127; cf. B., 1928, 284).-The influence of the hydrogen-ion concentration factor on the stabilisation and deterioration of fluid extracts and tinctures of veratrum has been extensively studied. The activity of the preparations is controlled by the hydrogen-ion concentration and PH 4-5 is apparently the most satisfactory value for the stabilisation of the active principles. The stability rapidly decreases with lessening values of $p_{\rm H}$. The chemical assay method is unreliable, and it is recommended that the lethal mouse method should be used. Also distilled water dilutions are more reliable than alcoholic dilutions. E. H. SHARPLES.

Reactions of novocaine. L. EKKERT (Pharm. Zentr., 1930, 71, 198).—Ten drops of a solution of 1 g. of *p*-dimethylaminobenzaldehyde in 10 c.c. of concentrated sulphuric acid are added to 0.01-0.02 g. of novocaine hydrochloride, and the mixture is carefully heated until it becomes coffee-brown. After cooling and mixing with about 5 c.c. of water, an intense yellow colour tinged with green is formed. The nitrate behaves similarly. Holocaine, stovaine, alypin, cocaine, and tropacocaine all give the brown colour on heating, but no yellow colour develops on dilution (cf. B., 1928, 836). E. H. SHARPLES.

Preparation of atropine. DULLUS (Chem.-Ztg., 1930, 54, 182).—Dried belladonna root is crushed finely, moistened with sodium hydroxide solution, and dried again after addition of a small quantity of solid, anhydrous sodium carbonate. The powdered product is

extracted with ether to remove fat and the residue is dissolved in 5% acetic or sulphuric acid. After filtration the atropine and hyoscyamine are precipitated with ammonia. The crude alkaloids are dissolved in dilute acid and colouring materials and resins are removed by shaking with ether; the liquid is then covered with an ether layer and potassium carbonate added slowly until precipitation commences, an excess of the solid salt is then added and the mixture vigorously shaken. The ether layer is poured off, dehydrated with solid potassium carbonate, and poured quickly through a folded paper. The filtrate is distilled until crystals begin to form, when it is cooled rapidly with agitation; the ether distillate is used for further extraction of the aqueous solution. The purified bases thus obtained are mixed with 50 c.c./kg. of pure chloroform and the mixture is heated at 116° for 1 hr. in an oil-bath to convert the hyoscyamine into atropine. After addition of 500 g. of acetone the crystals of atropine are collected on a vacuum filter, washed with acetone, and dried. For the preparation of the sulphate, 1 kg. of the base is dissolved in 1.3 litres of absolute alcohol and the solution nearly neutralised with an ice-cold solution of 170 g. of sulphuric acid $(d \ 1 \cdot 84)$ in $1 \cdot 3$ litres of absolute alcohol. The sulphate is subsequently precipitated by the slow addition of 10 litres of ether. A. R. POWELL.

Critical remarks on the U.S.P. pancreatin assay. F. E. WILLSON (J. Amer. Pharm. Assoc., 1930, 19, 128—129).—The end-point in the U.S.P. pancreatin assay method is not definite; precipitation is too prolonged and discordant results are obtained with different observers. In the determination of the amylolytic activity, if after the addition of the digested starch paste to the iodine solution the mixture be shaken as the end-point is approached, the blue colour disappears, and whether or not the solution is shaken has a considerable influence on the assay result. It is recommended that the mixture should not be shaken. Divergent results are obtained by using iodine solutions of different temperature, and a definite figure should be adhered to throughout; 23° is suggested.

E. H. SHARPLES.

Assay of pancreatin. F. E. WILLSON (J. Amer. Pharm. Assoc., 1930, 19, 129-132).-The following method for the determination of the tryptic activity of pancreatin is better than the U.S.P. method in that a definite end-point is obtained, it is much shorter, and more consistent results can be obtained especially with the higher-strength samples of pancreatin. Two tubes, one containing 24 c.c. of distilled water and 25 c.c. of 4% casein solution, and the other 25 c.c. of each, respectively, are heated to 55° in a water-bath. To the first is added 1 c.c. of the pancreatin solution, and the mixture digested at 55° for exactly 20 min. Meanwhile 20 c.c. of the blank are mixed with 10 c.c. of neutral 40% formaldehyde and neutralised to phenolphthalein with 0.1N-sodium hydroxide; 20 c.c. of the test solution are treated similarly, and the net amount (in c.c.) of 0.1N-alkali necessary multiplied by 100 is the percentage strength of tryptic activity. The original case in solution should be maintained at between $p_{\rm H}$ 7.0 and 8.0, and it may be preserved by the addition of E. H. SHARPLES. chloroform.

Evaluation of digitalis. A. STASIAK and B. ZBORAY (Magyar gyógysz Táras. Ertes., 1929, 5, 257—272; Chem. Zentr., 1929, ii, 1951).—A study of the frog-sinus method. A standard preparation must always be tested at the same time; for the standard preparation powdered digitalis leaves are preferred. When these precautions are observed, the frog-sinus method gives results in accord with those obtained by the 6-hr. frog method and the cat method.

A. A. ELDRIDGE.

Estimation of carbolic acid in pharmaceutical preparations. J. RAE (Pharm. J., 1930, 124, 239— 240).—A colorimetric method which has been found suitable for glycerin of carbolic acid, and for carbolic acid lozenges and pills, based on the colour developed on addition of sodium nitrite and sulphuric acid, is described. Substances normally present in the preparations do not interfere, but oxidising agents must be absent. S. I. LEVY.

Determination of hypophosphorous, phosphoric, and glycerophosphoric acids in pharmaceutical mixtures of their salts. F. E. RAURICH (Anal. Fis. Quím., 1930, 28, 160-166).-Hypophosphite is determined by adding an excess of silver nitrate to the acidified solution and weighing the precipitated silver; sodium acetate is then added to the filtrate and the precipitate of silver phosphate, corresponding to the phosphate originally present and to the oxidised hypophosphite, is separated and weighed. Sucrose, if present in the preparation, is destroyed by fuming nitric acid, sulphuric acid, potassium permanganate, and hydrogen peroxide, and finally the glycerophosphate is determined by the usual molybdate method. Iodometric methods are not applicable on account of the organic material usually present, which may absorb a considerable quantity of iodine. H. F. GILLBE.

Loss of volatile products during the curing and fermentation of tobacco. S. M. PETRIK (U.S.S.R. State Inst. Tobacco Invest., 1929, Bull. 63, 24 pp.).-The loss of methyl alcohol during the fermentation and curing of yellow cigarette tobaccos (Platana Arcadia and Tykkulak) is less than in the case of cigar tobaccos. The longer the period of starving, the greater is the loss of methyl alcohol during the whole process, but the less is the loss during the actual fermentation. The loss of methyl alcohol during the fermentation of high-grade industrial tobaccos is very small as they are thoroughly starved. The methoxyl content of pectin obtained from Platana Arcadia and Tykkulak was 4.98% and 6.62%, respectively. The pectin is the chief source of methyl alcohol in tobacco. The air in the first fermentation warehouse in Krasnodar contained methyl alcohol, volatile oily products of unknown nature, and carbon monoxide, but no nicotine nor other volatile bases.

W. O. KERMACK.

Oil of frankincense. A. BLUMANN and L. SCHULZ (Annalen, 1930, 478, 303–306).—By treating the highboiling fraction of oil of frankincense with sodium sulphite and bicarbonate, a ketone, $[\alpha]_D + 172 \cdot 4^\circ$, has been isolated which is identified as a mixture of *d*- and *l*-verbenone, since it has the same physical constants and yields an identical semicarbazone. Further frac-

tionation of the non-aldehydic portion, followed by separation of the alcohols by distillation with boric acid, does not yield verbenol, which is decomposed, but its presence is definitely shown by the isolation of verbenene dibromide by bromination of the mixture of hydrocarbons distilled from the borates. It is concluded that the olibanol of Fromm and Autin (A., 1914, i, 70) is a mixture of verbenone, verbenol, and other terpene alcohols. Indications have, however, been obtained of the presence of the olibanol of Haensel (A., 1908, i, 665) in the highest-boiling fraction of the alcohols.

R. K. CALLOW.

Colour reactions of essential oils. L. EKKERT (Pharm. Zentr., 1930, 71, 195—198; cf. B., 1927, 859).— Colour reactions of 62 essential oils mixed with alcoholic solutions of various phenols and "layered" with concentrated sulphuric acid are given. E. H. SHARPLES.

Tobacco-seed oil. PIATNITZKI.—See XII. Growth, transpiration, and storage of ash in tobacco. KALITAEVA.—See XVI. Determination of vanillin. Towr.—See XIX.

PATENTS.

Manufacture of pinene hydrochloride and synthetic camphor. W. A. GAWALOWSKI and L. S. SACHAROV (F.P. 597,063, 17.4.25).—Pinene, b.p. 155— 162°, is treated with hydrogen chloride at 0-20°, and the hydrochloride is oxidised at 170—180° and 15 atm. pressure with oxides or peroxides of lead, manganese, nickel, cobalt, zinc, or tin, or especially "ferric acid" (FeO₂ or FeO₃), in presence of sodium carbonate or bicarbonate, lime, or acetic acid.

C. HOLLINS.

Manufacture of pinene hydrochloride and of camphor therefrom. Soc. D'ETUDES POUR[•] LE CAMPHRE DE SYNTHÈSE (F.P. 621,398—9, 13.1.26).— (A) Dry hydrogen chloride is led over the surface of turpentine oil. (B) The hydrochloride crystals which sink to the bottom of the vessel are treated with milk of lime and the resulting camphene is oxidised with air. The camphor is freed from traces of chlorine by heating with caustic alkali at 150°. C. HOLLINS.

Manufacture of camphor from turpentine oil. A. ADIDA (F.P. 606,748, 20.11.25).—d- α -Pinene is heated with picric acid in benzene at 120° for $\frac{1}{2}$ hr.; the resulting bornyl picrate is hydrolysed with caustic alkali and oxidised to camphor. Hydrolysis of the picrate from the mother-liquors gives fenchol and borneol. C. HOLLINS.

Production of αδ-diamino-β-ketobutane [-butanone] dihydrochloride and 2-thiol-4(5)-β-aminoethylglyoxaline. Boots PURE DRUG Co., LTD., and F. L. PYMAN (B.P. 325,151, 22.3.29).—αδ-Dibenzamidobutan-β-one is hydrolysed with aqueous alcoholic hydrochloric acid at 150° under pressure, and the diamine dihydrochloride, m.p. 221° (decomp.; picrate, m.p. 212°), is condensed with sodium thiocyanate (1 mol.) to give 2-thiol-4(5)-β-aminoethylglyoxaline [hydrochloride, m.p. 248—249° (decomp.); picrate, m.p. 225° (decomp.)], which may be converted by oxidation with ferric chloride into histamine. C. HOLLINS. Thiazine derivatives [antiparasitics]. E. ROTHLIN and F. MÜLLER, Assrs. to CHEM. WORKS FORMERLY SANDOZ (U.S.P. 1,737,475, 26.11.29. Appl., 16.12.27. Switz., 29.12.26).—Thiazines, e.g., tetramethyldiaminophenthiazine, are converted into their bile acid salts, especially cholates, which have antiparasitic properties. C. HOLLINS.

Manufacture of organic mercury compounds [mercurisation of benzene]. A. CARPMAEL. From I. G. FARBENIND. A.-G. (B.P. 325,266, 15.11.28).— Mercuric acetate is heated under reflux with benzene in the presence of a non-reacting solvent, e.g., nitrobenzene, o-dichlorobenzene, in quantity sufficient to maintain the b.p. at $130-135^{\circ}$; when the addition of sodium hydroxide to a sample no longer precipitates mercuric oxide, the solution is filtered and concentrated *in vacuo*. After crystallisation from water, the product, phenylmercuric acetate, has m.p. 148° (cf. Dimroth, B., 1898, 1173). L. A. COLES.

Production of serum for prevention and cure of tuberculosis. REISCHACH & Co., G.M.B.H. (B.P. 297,675, 17.9.28. Ger., 24.9.27).—The caseous degeneration tissues of cattle etc. are extracted and sterilised with a mixture of solutions containing 10 g. of sodium chloride in 100 c.c. of glycerin and 0.1 g. of Trypaflavine in 100 c.c. of 1% phenol solution; after four days the mixture is filtered through material which does not allow the germs to pass, *e.g.*, compressed asbestos paper, and the residue is dried and ground. The filtrate, after further filtration, may be used for preventive inoculation, or a mixture of it with the dried residue may be used for the inoculation of animals for the production of lymph, the local inflammation set up being maintained by the application of suction cups.

L. A. Coles.

Surgical dressings, bandages, etc. BRIT. CELAN-ESE, LTD. (B.P. 307,459, 6.3.29. U.S., 8.3.28).—A pad of raw cotton or fluffed cellulose acetate is enclosed in a fabric of cellulose acetate; other cellulose esters or ethers may be used. L. A. COLES.

Cigarette papers (B.P. 325,125).—See V.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Preparation of fine-grain plates. M. N. LEROY (Brit. J. Phot., 1930, 77, 125).—A mixture of 3 c.c. of a 10% solution of colloidal silver with 50 c.c. of a 5% gelatin solution is coated evenly upon glass and dried. The colloidal silver is converted into silver chloride by bathing in a solution containing sodium chloride 2 g., copper sulphate 2 g., water 100 c.c., and the plates are washed and redried. Bromide or iodide plates may be prepared by substituting potassium bromide or iodide for sodium chloride, but in the preparation of the iodising bath the cuprous iodide first formed must be removed by filtration. The sensitivity of the plates may be increased by bathing in a 0.02% solution of silver nitrate followed by rinsing and drying. The following developer is recommended for use with the plates : potassium bromide 7.5 g., diaminophenol hydrochloride 3 g., sodium sulphite (anhyd.) 40 g., water 1000 c.c. J. W. GLASSETT.

Action of chromic acid on the sensitivity of solarised silver bromide plates. A. P. H. TRIVELLI and R. P. LOVELAND (J. Franklin Inst., 1929, 208, 731-766).-The desensitising curve representing the action of chromic acid on pure bromide emulsions in the solarisation region is irregular in form. This is found to be due to an abnormal distribution of silver in the developed grains of the untreated emulsion, the relative weight of silver increasing with decreasing density in the first reversal of the solarisation. By using silver weights instead of densities, the curves become simpler and show in the over-exposure region an increase and a second decrease of sensitivity after treatment with acid. After treatment, development of the grains of the emulsion proceeds in the usual way, the amount of silver being approximately proportional to the density. These results are discussed in relation to the view that the action of chromic acid on the sensitivity of photographic emulsions is constituted of a slow action on the silver halide, an action on the silver and silver sulphide of the sensitivity specks at different rates, and an action on the gelatin as a result of which a new sensitiser is produced and destroyed.

R. CUTHILL.

Desensitising and the latent image. LÜPPO-CRAMER (Brit. J. Phot., 1930, 77, 151—153).—It is shown that the latent image on exposed plates treated with desensitisers is readily destroyed by exposure to red light, and the suggestion is made that this destructive action of the red light is the responsible factor in many observed cases of latent-image destruction by desensitisers, the action of the desensitisers themselves being negligible. J. W. GLASSET.

PATENTS.

[Photographically] transferring subjects to metal [zinc or copper] surfaces. H. L. KREBS (U.S.P. 1,742,710, 7.1.30. Appl., 29.3.28).—A silver print bleached by treatment with a solution containing potassium ferricyanide and, if desired, potassium oxalate or bromide, or lead nitrate and nitric acid if the image is to be transferred to copper, is applied to a sheet or roll of the metal and the back of the print is moistened with dilute ammonia or concentrated ammonium carbonate solution. The print is withdrawn after about 1 min., leaving an image which can be used, *e.g.*, as a foundation for etching or for the application of acidproof inks. L. A. COLES.

Production of photographic images. E. GAY (U.S.P. 1,751,318, 18.3.30. Appl., 14.10.26. Fr., 23.10.25).—See B.P. 283,274; B., 1928, 213.

[Multi-colour filter] for colour photography and kinematography. C. NORDMANN (B.P. 309,504, 11.4.29. Fr., 11.4.28).

Ascertaining or comparing the density or translucency of photographic images and apparatus therefor. C. E. BELL and L. G. SCOTT (B.P. 326,201, 7.11.28).

Colorimeter (B.P. 324,351).—See I. Decorative glass (B.P. 325,924).—See VIII.

XXII.—EXPLOSIVES; MATCHES.

Laws of combustion of colloidal [explosive] powders. H. MURAOUR and G. AUNIS (Compt. rend., 1930, 190, 485-488; cf. A., 1928, 141, 770).—From the results of experiments carried out with a powder free from solvent and containing 13% N, in a bomb of 150 c.c.capacity, giving rise to pressures of 54-4310 kg./cm.², K (cf. B., 1926, 722) is calculated. Defining the intensity of combustion as 1/K, this is shown to be a linear function of the inverse of the maximum pressure (save for the smallest charge). For a pressure of 70 kg./cm.² it is about double that for one of about 2000 kg./cm.²

C. A. Silberrad. Patents.

Explosive. L. W. BABCOCK, Assr. to HERCULES POWDER CO. (U.S.P. 1,741,146, 31.12.29. Appl., 4.5.27). —Bagasse, comprising the pith and fibre of sugar cane, is ground to a desired fineness and boiled in water, so as to lower its density without increasing its absorbency. The treated product is used as a constituent of explosives, which thereby acquire a low density. In dynamite, in which the carbonaceous material, consisting of 6% of unboiled bagasse and 4% of coarse oat hulls, was replaced by 6% of boiled bagasse, the number of cartridges per 100 lb. was increased from 330 to 351, whilst with 8% of boiled bagasse the cartridge count was 365 per 100 lb. W. J. WRIGHT.

Treatment of nitrocellulose. IMPERIAL CHEM-INDUSTRIES, LTD., and J. S. B. FLEMING (B.P. 325,254, 16.10.28).—The water-absorbent power of normal butyl alcohol, used for dehydrating wet nitrocellulose and wetting it to make it safe for transport, is increased by the addition of a small amount of ethyl alcohol; at 20°, 10% of the latter solvent increases the absorbency of the butyl alcohol from 23 to 30%, which is found to be sufficient in practice. A higher percentage of ethyl alcohol is undesirable when the nitrocellulose is used for the manufacture of lacquers, as it lowers the flash point too much. W. J. WRIGHT.

Manufacture of cordeau. W. O. SNELLING and C. B. KOCH, Assrs. to TROJAN POWDER CO. (U.S.P. 1,741,380, 31.12.29. Appl., 30.9.25).—After a lead tube has been filled with molten trinitrotoluene, and the latter allowed to cool, the tube instead of being rolled or drawn is subjected over its entire circumference to the action of rapidly moving hammers, whereby its length is increased and its diameter decreased. The temperature of the trinitrotoluene must be kept below its m.p. during the operation, a current of air being directed against the tube. By this method the trinitrotoluene is reduced to a finer state of division and consequently becomes more sensitive, and the cordeau is smoother and stronger than when drawn or rolled. W. J. WRIGHT.

XXIII.-SANITATION; WATER PURIFICATION.

Foaming and sludge digestion in Imhoff tanks. W. D. HATFIELD (Ind. Eng. Chem., 1930, 22, 172—174).—Foaming always occurred in Imhoff tanks at Decatur, Illinois (where the sewage is abnormal owing to the presence of a large proportion of starchwastes), shortly after the plant had been recommissioned after a stoppage. Addition of lime repressed, but did not prevent, the tendency to foam, and the amount required when much sludge was present was prohibitive on the ground of cost. Once the foaming ceased there was no recurrence so long as the plant remained in commission. The digestion of fresh solids proceeds very rapidly during the first 24 hrs., probably owing to the high sewage temperature (20—32°) and the nature of the trade-waste present. C. JEPSON.

New chlorine-silver method of disinfecting [water] in combination with the chlorine-copper method. W. OLSZEWSKI (Pharm. Zentr., 1930, 71, 161—162).—The quantities of chlorine required and of silver dissolved are greatly diminished if cupric chloride be added to the water. S. I. LEVY.

PATENTS.

Sterilisation of liquids. G. A. KRAUSE (B.P. 325,796, 21.11.28).—Water which has been partially sterilised by contact with oligodynamic metals becomes further sterilised on being kept for several hours out of contact with such substances. Untreated, non-sterile water when mixed with partially or completely sterilised on keeping and may then receive a final contact to complete the sterilisation process. In this way the volume of water dealt with by a definite amount of the active metal may be substantially increased. Suitable apparatus is described and its application in the brewing industry is indicated (cf. B.P. 325,004; B., 1930, 350). C. JEPSON.

Purifying aqueous liquids, particularly waste water from factories. METALLGES. A.-G. (B.P. 305,657, 24.1.29. Ger., 9.2.28).-Waste water (e.g., from coking installations) containing products which it is desirable to recover may be treated with a suitable adsorption media, e.g., active carbon, and the adsorbed material extracted therefrom and subsequently separated by means of a solvent which is separable from water. The adsorption media is freed from traces of solvent and re-activated in any suitable manner, e.g., by scavenging with live steam. The process may be carried out in filters containing media to a depth of a metre or more and which are charged in an upward direction, whilst the extraction and re-activation are effected in a downward direction. C. JEPSON.

Sterilisation of water. O. and R. ADLER (U.S.P. 1,750,561, 11.3.30. Appl., 11.6.28. Czechoslov., 13.6.27).—See B.P. 292,099; B., 1928, 876.

Biological purification of waste water. F. SIM-MER, ASST. to A./S. DANSK GAERINGS-IND. (U.S.P. 1,751,459, 18.3.30. Appl., 13.1.28. Austr., 2.3.26).— See B.P. 307,587; B., 1929, 418.

[Valve for] base-exchange water-softening apparatus. 0. Olsson (B.P. 325,886, 3.12.28).