BRITISH CHEMICAL ABSTRACTS

B.—APPLIED CHEMISTRY

JANUARY 8, 1926.

I.—GENERAL; PLANT; MACHINERY.

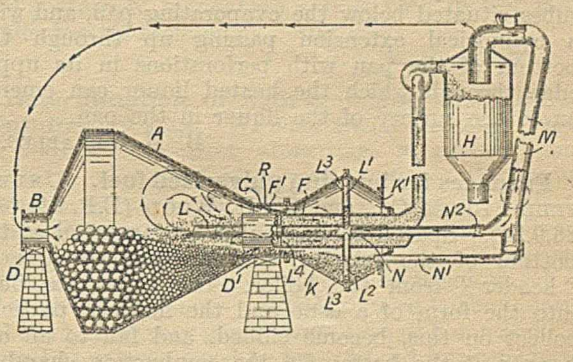
New methods of gas washing. IV. Absorption curves with mixed absorbents. G. Weissenberger, F. Schuster, and O. Zack (Z. angew. Chem., 1925, 38, 1010—1013; *cf.* B., 1925, 388, 697).—In certain cases of the extraction of vapour from a gas by washing with a liquid which forms with the vapour a molecular compound, it is necessary to add a second liquid to the " extractor " which, while taking no part in the primary absorption, protects the extractor against some harmful secondary reaction. Thus in the extraction of methyl acetate by phenol the dilution of the latter with tetralin protects it against rapid resinification. The vapour pressures at different concentrations of the following systems were determined:—vapours: methyl acetate and ethyl acetate; extractor; phenol; protectors: tetralin and *cyclo*hexanol; vapour: chloroform; extractor: tetralin; protector: phenol. The choice of the " protector " modifies greatly the experimentally determined vapour pressures. For the absorption of methyl acetate in phenol much better results will be obtained with the use of tetralin than of *cyclo*hexanol. Quite different results are found in the case of ethyl acetate vapour. A further variation occurs in the absorption of chloroform in tetralin with phenol as protector. In this case the protector has only a very slight influence on the process. C. Irwin.

[Use of] ethyleneglycol [as anti-freeze material]. G. O. Curme, jun., and C. O. Young (Ind. Eng. Chem., 1925, 17, 1117—1120).—Ethyleneglycol, which is now being produced in large quantities, is satisfactory for use as anti-freeze material in motor car radiators. It is non-corrosive, odourless, and non-inflammable; it does not vaporise or decompose, nor does it attack lacquer or varnish. A 35% solution in water freezes at about −20°. L. A. Coles.

Patents.

Refrigerating apparatus of the absorption type. Platen-Munters Refrigerating System Aktiebolag (E.P. 231,521, 28.3.25. Conv., 29.3.24).—The patent describes various forms of cooler for an absorption refrigerating system in which an inert carrier gas is used as well as the vaporising liquid. The coolers combine large surface for evaporation, good heat conductivity to the outside air, and absence of obstruction to the flow of gas. B. M. Venables.

Dry grinding or crushing apparatus. H. W. Hardinge (E.P. 241,268, 15.7.24).*—A cylindro-conical ball or pebble mill is provided with a device for the separation of dust and return of oversize as shown in the figure. *F* is an eduction conduit for air and finely-ground material, the part of which to the left of the stationary disc, K^1, rotates with the mill, whilst the part to the right is fixed. The conical classifier, *K*, with the pipes, L^1, L^2, and *L*, also rotate with the mill and together serve to return partially ground material to a point in the mill, *A*, where it may most effectively be re-ground, the pipes L^1, L^2 being bent to form scoops. The dusty air is drawn by a fan and delivered to a collector, *H*, and practically clean air is returned to the mill through the conduit, *M*, which branches into two conduits, N^2 and N^1. The air stream in N^2 passes through a nozzle and assists the oversize on its way back to the mill. The air in N^1 is blown over the surface of the material in the classifier, *K*, and returns any dust to the mill at a point where it can easily be collected by the stream of air going out through *F*. The trunnion outlet, *C*, is provided with inclined shallow helical ribs, *R*, to return any balls, pebbles, or chips to the mill, without interfering with the output of partially-ground material. B. M. Venables.



Viscosimeters. G. G. Stoney and R. O. Boswall (E.P. 241,652, 12.8.24).—A viscosimeter suitable for measuring the viscosity of oil in the feed of an oil engine, or for other similar purpose, comprises a tube and an orifice in series, with means for measuring the fall of pressure between the inflow and exit ends of the tube and orifice. If the flow is so adjusted that the pressure fall at the orifice is constant, then the fall between the inflow and exit ends of the tube bears a simple relation to the viscosity and affords a measure of the latter. A. B. Manning.

Evaporators. H. Fothergill (E.P. 241,671, 4.9.24).—In a flash evaporator in which the liquid to be evaporated is heated at a high pressure and evaporated at a lower pressure, the difference in pressure is produced by the friction of the liquid in the conduits and/or the spraying jets. B. M. Venables.

Evaporation of solutions of salt or other substances to produce crystals. R. France (E.P. 242,018, 23.8 and 19.12.24).—The solution is circulated through a heater and evaporating pan by means of a pump or by thermo-siphon action. The pan, which is open to the atmosphere, is not heated but is reserved for evaporation and removal of crystals, and baffles are provided to prevent deposited crystals entering the return pipe. The heater may take the form of a cylindrical vessel with a nest of heating tubes situated below the evaporating pan, and with a cylindrical extension passing up through the bottom of the pan with perforations in its upper edge through which the heated liquor can emerge on to the surface of the liquor in the pan. B. M. Venables.

Furnaces for burning pulverised fuel. Underfeed Stoker Co., and W. R. Wood (E.P. 241,691, 26.9.24).—Spaced cooling tubes are arranged at the bottom of the furnace, and are connected to a "header" from the boiler. The tubes are built into the form of a cone and the fine ash particles collect on this, become chilled, and fall to an ash hopper at the bottom of the combustion chamber. The lower part of the walls of the combustion chamber are also cooled by the insertion of "fin tubes" which prevent any ash fusing to the walls. The extra heating surface provided by the tubes allows of a material reduction of the boiler proper. W. S. Patterson.

Method of conveying heat energy. J. N. D. Heenan, Assr. to Power Specialty Co. (U.S.P. 1,558,871, 27.10.25. Appl., 11.12.18).—A fluid is heated indirectly from a source of heat by means of a fluid heat-transferring medium which flows in a conduit arranged as pipe coils alternately in a flue connected with the source of heat and in the material to be heated. The coils in the material to be heated are so arranged that each coil has a greater exposed area than the one preceding it, in the direction of flow of the heat-transferring medium, and the coils which are being heated are so arranged that each has a greater area than any other nearer the source of heat. B. M. Venables.

Heating method and apparatus. F. Puening (U.S.P. 1,542,953–7, 23.6.25. Appl., 16.7.20, 11.12.22, 18.1.23, 31.1.23, and 23.1.24).—See E.P. 208,170, 210,068, and 210,758; B., 1925, 527, 867. The additional details given relate mainly to means of keeping the piston cool. B. M. Venables.

Apparatus for extraction, solution, and mixture of soluble and insoluble substances. N. Bendixen, W. E. McKechnie, and E. L. Reid (E.P. 242,020, 27.8 and 11.11.24).—A propeller rotates in a chamber bounded by a vertical serrated or corrugated and perforated wall, the serrations being parallel to the axis. Outside the propeller chamber is an intermediate wall and outside of all, the non-perforated casing or liquid container. When solid substances are to be extracted by the flow of liquid through them, the intermediate wall is perforated and situated some distance from the inner wall, the solid matter being contained in the annular space between the two, but when emulsions are to be formed from substances that are already liquid or finely divided, the intermediate wall need not be perforated but should be arranged to touch the ridges of the serrations of the inner wall, thus forming a number of vertical passages. The propeller drives the liquid both outwards and downwards and a vertical flow is produced in the passages between the two walls which has the effect of shearing the particles or globules that are driven outwards from the propeller chamber. B. M. Venables.

Drying apparatus. D. V. Sherban, Assr. to Bonnot Co. (U.S.P. 1,558,119, 20.10.25. Appl., 6.11.24).—The material to be dried is delivered into a hopper provided at its lower end with spaced ring plates. A series of conical plates, spaced from the ring plates, is rotated, and means are provided for passing hot gases between the conical plates and the ring plates. H. Holmes.

Treatment of liquids with gases. Chem. Fabr. Niederrhein Ges., and K. Ullmann (G.P. 417,507, 13.11.23).—The gas, under pressure less than that of the hydrostatic pressure of the liquid, is introduced into the liquid, and suction applied by means of a rotary pump, so that the liquid is drawn through the pump after the gas. The mixture is then forced through a long channel in which the rate of flow of the gas differs from that of the liquid. B. W. Clarke.

Air-cleaning [filter] materials. Reed Air Filter Co., Assees. of C. P. Hegan (E.P. 231,435, 6.2.25. Conv., 27.3.24).—See U.S.P. 1,515,949; B., 1925, 32.

Operation of reverberatory furnaces. Flame furnace.—H. Mehner (U.S.P. 1,545,154–5, 7.7.25. Appl., 14.2.22 and 10.4.25).—See E.P. 196,658; J., 1923, 589A.

Thickening [filtering] process. A. L. Genter, Assr. to Gen. Engineering Co. (U.S.P. 1,560,796, 10.11.25. Appl., 2.1.24).—See E.P. 227,094; B., 1925, 698.

Grinding mill. J. B. Sedberry (U.S.P. 1,560,865, 10.11.25. Appl., 28.11.23. Renewed 10.4.25).—See E.P. 229,034; B., 1925, 304.

Coal dust furnaces. G. Hayn (E.P. 241,882, 8.10.25. Conv., 24.10.24).

Purifier for [separating suspended particles from] air or gas. C. L. Burdick (E.P. 242,388, 12.9.24).

Mixing and kneading machines. Haagen & Rinau, and W. Rinau (E.P. 242,573, 28.8.25. Conv., 21.2.25).

Crushing discs. E. Symons (E.P. 242,831, 2.2.25).

Separation of liquids from gases. H. S. Hele-Shaw and T. E. Beacham (E.P. 242,918, 29.12.24),

II.—FUEL; GAS; DESTRUCTIVE DISTILLATION; MINERAL OILS.

Examination of coal and grain size of samples for analysis. D. J. W. Kreulen (Chem. Weekblad, 1925, 22, 558—560; *cf.* B., 1924, 775, 896).—Various tests applied after different mixing and sieving operations show that results vary with the grain size and degree of mixing. Material passed through a 10-mesh sieve gave results varying considerably, according to the procedure adopted in mixing after sieving, but material passed through sieves of finer mesh gives uniform results. S. I. Levy.

Mixing of coal samples and methods of obtaining final samples. D. J. W. Kreulen (Chem. Weekblad, 1925, 22, 560—561; *cf.* B., 1924, 83, and preceding abstract).—Various methods of mixing and of drawing small samples for analysis from the mixed material have been examined by comparison of analytical results in the various cases. The American method of spreading out in a long layer and taking scoopfuls alternately from left to right and from right to left gives the best results. S. I. Levy.

Oily bitumen and solid bitumen of bituminous coal. H. Broche and T. Bahr (Brennstoff-Chem., 1925, 6, 349—354; *cf.* B., 1924, 584.). Bone (J., 1925, 291 T) has suggested that the apparent discrepancy between his results and those of Fischer, Broche, and Strauch is due to the incomplete separation of the constituents of the benzene extract by the latter. A repetition and extension of the work shows this not to be the case, and confirms the conclusion that the oily bitumen is mainly responsible for the coking (*i.e.*, binding) property of the original coal, but that the swelling is due to the solid bitumen. Bone's results on the addition of the bitumen to powdered coke have been confirmed, and the discrepancy shown to lie in the use of powdered coke instead of the residue after extraction when investigating the relation of the bitumen constituents to coking property. On addition of the extracted bitumen to the residue the full coking properties of the original coal are recovered, but are almost completely lost if the residue is replaced by powdered coke. Misleading results are obtained also if the particle size of the residue and conditions of coking are not carefully controlled. If the residue is powdered too finely before or after addition of the bitumen, the coking power is not fully recovered. Some further experiments have been made on the separation and purification of the bitumen constituents. Extraction of the coal with light petroleum (b.p. 65—90° or 100—125°) under pressure at 285° removes very little of the coking constituents. A. B. Manning.

[Steel] bomb calorimeters. W. Kohen (Chem.-Ztg., 1925, 49, 935—936).—Plain steel bomb calorimeters with enamel linings have the disadvantage that the lining wears out comparatively rapidly. Calorimeters made of V2A steel, which contains nickel resist the action of the products of combustion quite well, but have a low thermal conductivity. Rustless (stainless) steel is even more resistant to corrosion than V2A steel, and has a much better heat conductivity. During the first few combustions a very slight amount of iron (about 1—2 mg.) is dissolved, but with use an inert film is formed on the surface and no further attack takes place unless the substance burnt contains chlorine or much sulphur. The best steel for the making of bomb calorimeters contains 0·14% C, 0·496% Si, 16·5% Cr, and a trace of manganese; it is used in Germany under the trade name of " Antinit." A. R. Powell.

Determination of hydrogen and methane in illuminating gas. W. Steuer (Chem.-Ztg., 1925, 49, 901—902).—After absorption of carbon monoxide in the usual way with ammoniacal cuprous chloride solution, the Hempel or Winkler burette containing the remaining gas is connected to a second burette, containing a known volume of pure oxygen, by means of a capillary quartz tube inside which is a thick platinum or palladium wire. The quartz tube is heated very gently with a small flame and the mixed gases are passed backwards and forwards until constant volume is attained. The metal acts as a catalyst; the hydrogen only is burned and is determined by the contraction measured. The capillary is then heated to a clear red heat, and the process repeated. The amount of methane can be calculated from the contraction in volume or the carbon dioxide formed can be absorbed. Alternatively, as soon as most of the hydrogen has combined, the capillary is strongly heated and the remaining hydrogen and the methane are burned at the same time, without risk of explosion. The method is rapid and accurate. C. T. Gimingham.

Corrosion of copper pipe by kerosene. E. Staudt (Chem.-Ztg., 1925, 49, 952).—A spiral copper pipe leading kerosene to the carburettor and heated externally by the exhaust gases, was installed on a tractor. After two weeks the pipe was found to be almost filled with a grey-black mass, and the walls of the pipe were reduced to 0·1 mm. in thickness. The deposit contained 1% of copper sulphate, and the remainder corresponded to the formula Cu_2S. The kerosene had a sulphur content of 0·104%, and as 40 litres passed through the pipe daily this was quantitatively sufficient for the formation of the deposit. The deposit, being porous, did not form a protective layer. Copper is unsafe for conduits for petroleum oils at elevated temperatures.

H. Moore.

Gas washing. Absorption with mixed absorbents. Weissenberger, Schuster, and Zack.—See I.

Mechanical condition of ammonium sulphate. Cummings.—See VII.

Patents.

Briquetting fuels. Frankensteiner Magnesitwerke A.-G., Assees. of R. Kattner (E.P. 241,175, 14.9.25. Conv., 11.10.24. Not yet accepted).—In utilising magnesia cement for briquetting fuel, the coal dust or the like is first treated with ground magnesium chloride (1%), and an amount of water necessary for briquetting is added. Calcined magnesia (2%) is only added when the mixture is ready to be moulded.

Production of fuel of high calorific value from semi-coke. E. C. R. Marks. From Kohlenscheidungs-Ges.m.b.H. (E.P. 241,262, 11.7.24).—Coke obtained by the low-temperatire distillation of fuel is pulverised and treated for the removal of ash. The product may be briquetted or suspended in oil with the addition of a protective colloid.

H. Hollings.

Coke ovens. Soc. Gén. de Fours à Coke Systèmes Lecocq (E.P. 231,483, 23.3.25. Conv., 29.3.24).—Even heating in coke ovens of great height is obtained by admitting the necessary air for combustion into the vertical heating flues at two stages. The primary air and the secondary air are admitted independently to the conduits in the heating walls from two hearth flues extending the whole length of the oven. The passage of air from the regenerators to each hearth flue is controlled by dampers. The burnt gases are exhausted partly through conduits in the heating walls opening into a third flue in the hearth and partly through the base of the flues in the heating walls into a fourth flue in the hearth.

A. B. Manning.

Annular kilns [for drying and carbonising carbonaceous materials]. O. Dobbelstein and H. Hess (E.P. 228,532, 23.1.25. Conv., 2.2.24).*—An annular kiln comprises a rotary system of concentric ring pockets, *a*, separated by ring spaces, *b*, communicating with a stationary annular heating channel, *c*, situated below the pockets. The material is fed into the pockets from a hopper, *x*, and after treatment, is scraped out by a bucket elevator or by ploughs, *g*, which deliver it to a radially arranged conveyor, *h*. The casing, *d*, may be divided by radial partitions so that the distillation products can be collected separately at different stages. In a modification the system of pockets is stationary and the casing, *d*, with the feed hopper and discharge ploughs rotates. In another form the bottoms of the pockets, *a*, are formed by stationary plates having gaps at the discharging point.

B. W. Clarke.

FIG.1.

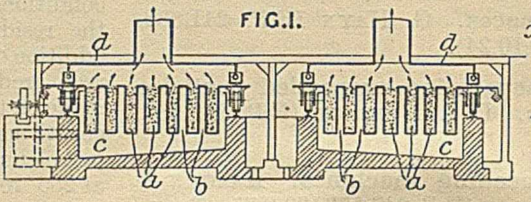
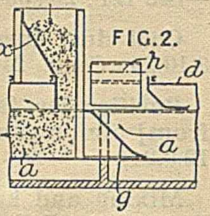
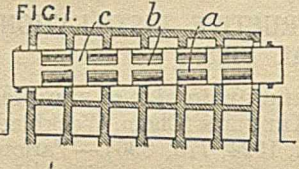


FIG.2.



[Destructive] distillation drums. Schwelkohle Kohlenschwelungsges., and D. Young (E.P. 240,795, 7.7.25. Conv., 3.10.24. Not yet accepted).*—In an inclined distillation drum the inner surface is provided with chambers, *a*, formed by partitions running longitudinally and transversely, these chambers carrying the charge round in them during the rotation of the drum. The chambers may either have circumferential spaces, *b*, between them or may be made in a closed ring. Longitudinally, the chambers are spaced apart at intervals, *c*.

FIG.1.



Distillation or heat treatment of carbonaceous and other materials. H. Nielsen and B. Laing (E.P. 241,659, 20.8.24).—A small retort for the laboratory assay of carbonaceous material comprises an outer and an inner vertical cylindrical chamber, surrounded by a coil through which a heating medium (steam, combustion gases, or a heated inert gas) can be conducted, the medium then passing down the annular space between the two chambers, and up through the perforated base-plate of the inner chamber. In the latter, it comes into direct contact with the material to be carbonised, and thence carries away the volatile products of decomposition to a condensing system. Auxiliary heating, when required, is provided by a gas burner at the base of the outer chamber. A slight modification of the apparatus makes it suitable for the treatment of liquid materials.

A. B. Manning.

Apparatus for the simultaneous production of low-temperature tar, semi-coke, and gas of high calorific value. N. Young (G.P. 414,185, 18.2.20. Addn. to 408,111).—Coal is passed through a rotating dryer before it enters the distillation retort in the apparatus described in the chief patent (*cf.* E.P. 134,529; J., 1921, 74 A). The dryer and retort are co-axial, are heated independently, and are connected with suction apparatus so operated that a portion of the steam generated in the dryer passes through the retort. The addition of the dryer increases the output of the retort.

L. A. Coles.

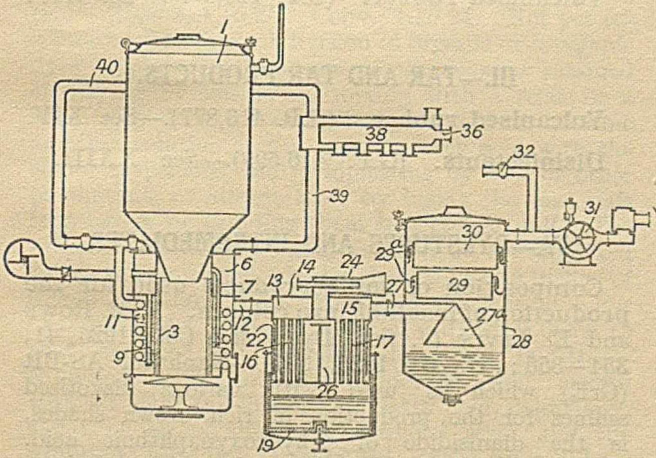
Manufacture of prepared charcoal. A. W. Smith, Assr. to W. W. Varney (U.S.P. 1,559,054, 27.10.25. Appl., 10.3.20).—A charcoal for decolorising, absorption, etc., is prepared by carbonising vegetable material which has been impregnated with a metal compound, the latter then being reduced to the metallic state. A. B. Manning.

Destructive distillation of wood. D. P. Shaw (U.S.P. 1,559,994, 3.11.25. Appl., 21.12.22).—The wood is progressively burnt from one end to the other of a kiln in a horizontal direction, and the distilled vapours are withdrawn from a zone in advance of the progressively burning portion, so as substantially to avoid intermixture with the gases of combustion. A. B. Manning.

Apparatus for wood distillation. J. L. Weaver (U.S.P. 1,560,517, 3.11.25. Appl., 21.3.21).—A retort for the distillation of wood is provided with a helical flue and a stack communicating with the flue in different horizontal planes, communication being controlled by means of dampers. A. B. Manning.

Desulphurising spent absorption charcoal. Badische Anilin- u. Soda-Fabr. (G.P. 417,614, 15.7.24).—The charcoal is heated to different temperatures in separate retorts, in such a manner that sulphur liberated by heating one portion of the charcoal reacts with another portion of the charcoal with the formation of carbon disulphide. L. A. Coles.

Semi-water-gas producer plants. R. Malbay (E.P. 224,520, 20.10.24. Conv., 9.11.23).*—Gas made in a generator, 3, passes down circularly disposed tubes, 7, into the space surrounding the coil, 11, and thence through the outlet, 12, down the tubes, 16, and up the tubes, 17, of a cooler, air being drawn over the tubes and through a chamber, 26, by means of an injector, 24, operated by the exhaust of an engine. The gas is then directed on to the surface of water by means of the tapered pipe, 27*a*, and passes through suspended coke filters, 29 and 30. The gas, thus purified, is mixed with air drawn in through the valve, 32, compressed in the compressor, 31, and supplied to the engine. The air supplied to the generator is drawn in through the opening, 36, preheated by contact with the engine exhaust collector, 38, and passed by a pipe, 39, to a boiler, 6, the air and steam from which meet an additional air supply from a pipe, 40, and are superheated in the coil, 11, before entering the bottom of the fuel bed. Field tubes, 9, depending from the boiler assist in heating the water. H. Hollings.



Manufacture of illuminating gas. L. S. Stiles (U.S.P. 1,558,124, 20.10.25. Appl., 10.6.20).—A rich carburetted water-gas is made in a separate generator fitted with a steam supply at the bottom and an oil supply at the top and is delivered into the carburettor of a plant making blue water-gas. H. Hollings.

Water-gas apparatus. L. S. Stiles (U.S.P. 1,558,125, 20.10.25. Appl., 18.8.21).—A vessel comprising an upper superheater chamber and a lower carburettor chamber is superimposed upon a gas generator. Oil is supplied to a chamber between the upper and lower portions of chequer brickwork placed between the carburettor and the superheater. Air for combustion is admitted to the carburettor and superheater during the heating-up process. The superheater is provided with a valve-controlled outlet for waste gas and a separate outlet in communication with a wash-box for water-gas. H. Hollings.

Gas purification and regenerating sulphided alkaline solutions. Koppers Co., Assees. of R. A. Morgen, W. S. Yard, and L. Rosenstein (E.P. 241,221, 10.10.25. Conv., 11.10.24. Not yet accepted). —Liquors containing sulphides, for example those produced in a gas-purifying process, are oxidised in the presence of a catalyst (nickel sulphide, cobalt sulphide) whereby the liquors are freed from sulphur, which separates in the elementary state.

Elimination of hydrogen sulphide from fuel gases such as coal gas, water-gas, and the like, and from air. Treatment of spent liquids of liquid gas purification. P. C. Rushen. From Koppers Co. (E.P. (a) 241,248 and (b) 241,452, 10.6.24).—(a) Air, which may result from the purification of gas as described in U.S.P. 1,389,980 and 1,390,037 (J., 1921, 762 a), or gas is washed with a suspension of a freshly precipitated iron compound, such as the hydroxide, carbonate, or sulphide, in an alkaline solution. The washing of air may take place in a stack fitted with spaced hurdles. The iron compound may be precipitated by the addition from time to time of an iron salt to the circulating liquid or it may be prepared externally. The alkalinity of the liquid is maintained equivalent to 0·5—2·0% Na_2CO_3. (b) The spent wash liquid is collected in a sump fitted with a horizontal partition of porous material such as "filtros" through which compressed air is passed upwards for the regeneration of the suspension. The sulphur carried to the surface of the liquid by the air is removed by skimming. The sump may be divided into compartments to each of which air is supplied from a manifold. H. Hollings.

Scrubbing hot gases for the recovery of hydrocarbons. Allgem. Vergasungs-Ges.m.b.H. (G.P. 416,815, 21.12.17.)—Hydrocarbons are extracted from gases at a temperature of, *e.g.*, 200—400°, by treating the gases, without previous cooling, with finely-divided tar and a cold, readily volatile liquid, such as water, in a rotary scrubbing apparatus. The resulting tar has a low water content. L. A. Coles.

Deodorising kerosene. W. Kritshevsky and H. C. Prutzman, Assrs. to W. Citron (U.S.P. 1,538,287, 19.5.25. Appl., 2.7.24).—Kerosene is washed with chlorosulphonic acid, then with alkali, and finally treated with a solid absorbent colloid. T. A. Smith.

Dehydrating oil. H. F. Owen (U.S.P. 1,538,739, 19.5.15. Appl., 10.12.23).—Oil is passed through a heater in a continuous stream, being whirled during the heating process. T. A. Smith.

Medium for bleaching, cracking and desulphurising petroleum and other hydrocarbon compounds. H. and H. Reinbold (U.S.P. 1,558,631–2, 27.10.25. Appl., 19.5.24).—(a) A medium for treating oils comprises hydrous silicic acid in combination with lithium chloride. (b) A medium comprising lithium chloride combined with aluminium chloride for treating oils is prepared by treating an alumino-silicate clay with hydrochloric acid and adding lithium chloride. H. Moore.

Condensing [hydrocarbon] vapours. E. W. Isom and J. E. Bell, Assrs. to Sinclair Refining Co. (U.S.P. 1,558,811, 27.10.25. Appl., 12.11.24).—The vapours are condensed by a cooled body of condensate of corresponding composition. A stream of condensate is circulated to and from the main body through an external circuit, the circulation being maintained by the injection of the vapours into the stream. H. Moore.

[Liquid] fuel. J. F. P. de la Riboisiere (U.S.P. 1,558,967, 27.10.25. Appl., 17.12.24).—The heat units obtainable from a heavy hydrocarbon fuel are increased by burning the fuel in the presence of a small proportion of a compound of a hydrocarbon radical with a metal. M. Cook.

Dehydrating emulsified oils. G. Egloff and H. P. Benner, Assrs. to Universal Oil Products Co. (U.S.P. 1,559,035, 27.10.25. Appl., 1.11.20. Renewed 28.3.25).—Heated emulsified petroleum oil is passed, under pressure, through a series of plates having perforations of decreasing size, and is simultaneously subjected to the action of an electric current. H. Moore.

Dehydration of oil. G. Egloff and J. C. Morrell, Assrs. to Universal Oil Products Co. (U.S.P. 1,559,036, 27.10.25. Appl., 18.2.22. Renewed 28.3.25).—A medium adapted to improve the conductivity is dissolved in the oil and water, and an electric current passed through. The water is then separated from the oil in a settling tank. H. Moore.

Manufacture of fuel briquettes. T. A. Goskar (U.S.P. 1,561,322, 10.11.25. Appl., 26.6.25).—See E.P. 231,934; B., 1925, 435.

Annular kiln for drying and carbonising solid carbonaceous or like material. O. Dobbelstein and H. Hess (U.S.P. 1,556,571, 6.10.25. Appl., 24.1.25).—See E.P. 228,532; preceding.

Retort for carbonisation of solid fuels. A. L. J. Queneau, Assr. to E. Heisch (U.S.P. 1,560,855, 10.11.25. Appl., 27.11.23).—See E.P. 221,679; B., 1924, 974.

Retort furnace. O. D. Lucas, Assr. to Vickers, Ltd. (U.S.P. 1,561,735, 17.11.25. Appl., 31.3.24).—See E.P. 220,684; B., 1924, 899.

Tar separator. B. Moscovitch, Assr. to "Lignojen" Maschinen- u. Apparatebau Ges. (U.S.P. 1,562,118, 17.11.25. Appl., 18.10.24).—See E.P. 239,065; B., 1925, 872.

Filtering liquids [mineral oils etc., with the aid of silicic acid]. F. Herrmann (E.P. 216,504, 5.5.24. Conv., 23.5.23).—See G.P. 402,508; B., 1925, 58.

Apparatus for carburetting coal gas [with petrol or the like]. E. McLaren (E.P. 242,553, 16.6.25).

Viscosimeters. (E.P. 241,652).—See I.

Bituminous binding materials. (E.P. 233,371).—See IX.

Bituminous emulsions. (E.P. 233,430).—See IX.

Vulcanised rubber. (G.P. 416,877).—See XIV.

III.—TAR AND TAR PRODUCTS.

Vulcanised rubber. (G.P. 416,877).—See XIV.

Disinfectants. (G.P. 416,599).—See XXIII.

IV.—DYESTUFFS AND INTERMEDIATES.

Composition of some products used for the production of insoluble azo colours. F. M. Rowe and E. Levin (J. Soc. Dyers and Col., 1925, **41**, 354—356; *cf.* B., 1925, 397).—Naphthol AS-BR (GrE) which is used with various diazotised amines for the production of rich brown shades, is the dianisidide of β-hydroxynaphthoic acid. Naphtholate AS (GrE) is a mixture of Naphthol AS and a soluble oil. Brenthol H soluble 50% paste (British Synthetics, Ltd.) (S) is an aqueous paste of a readily soluble combination of Naphthol AS and pyridine. Baths prepared from it can be kept almost indefinitely without occurrence of oxidation or polymerisation. Making use of the table of melting points (*cf.* B., 1924, 704) the following commercial bases have been identified: Fast Garnet base CL (JWL), Fast Garnet base L (JWL), Fast Garnet GB base (GrE), and Fast Garnet GC base (GrE), are *o*-aminoazotoluene. Fast Red base GL (JWL) and Fast Red GL base (GrE) are 3-nitro-*p*-toluidine. Fast Red base GL (JWL) and Fast Red GL base (GrE) are 3-nitro-*p*-toluidine. Fast Red base RL (JWL) and Fast Red RL base (GrE) are 5-nitro-*o*-toluidine. Fast Scarlet GL base special (JWL) and Fast Scarlet G base (GrE) are 4-nitro-*o*-toluidine. Fast Scarlet Base GCL (JWL) and Fast Scarlet GC base (GrE) are 4-nitro-*o*-toluidine hydrochloride. Fast Scarlet base 2 GL (JWL) and Fast Scarlet GG base (GrE) are 2:5-dichloroaniline. Fast Yellow base GL (JWL) and Fast Yellow G base (GrE) are *o*-chloroaniline, whilst Fast Yellow base GCL (JWL) and Fast Yellow GC base (GrE) are the hydrochloride of *o*-chloroaniline. Fast Orange G base (GrE) is *m*-chloroaniline. Fast Red KB base (GrE) used for colours fast to kier boiling is 4-chloro-*o*-toluidine. The Rapid Fast Printing Colours (GrE) contain as one component the stable nitrosoamine of a diazotised amine in a faintly alkaline medium. The Fast Salt series (GrE) are stabilised diazo-compounds which form solutions acid to litmus and can be used directly for the development of insoluble azo colours on prepared calico. Fast Red Salt B (GrE) is diazotised 5-nitro-2-aminoanisole, Fast Red Salt GG (GrE) is diazotised 2:5-dichloroaniline, Fast Red Salt GL (GrE) is diazotised 3-nitro-*p*-toluidine, and Fast Scarlet Salt R (GrE) is diazotised 4-nitro-2-aminoanisole. Permanent Red 2G (AGFA) and Monolite Red 2G (BDC) are diazotised *m*-dinitroaniline coupled with β-naphthol.

A. Coulthard.

Patents.

Manufacture of finely subdivided pigment dyes. Farbw. vorm. Meister, Lucius, u. Brüning (E.P. 240,852, 1.10.25. Conv., 1.10.24. Not yet accepted).—The fine subdivision of organic or inorganic dyes or pigments in aqueous suspension is retained on drying by intimately mixing with a resin or a solid fatty acid, for example by mixing an alkaline or other solution of the resin or fatty acid with the colour suspension and precipitating by acid or other precipitant, or alternatively by fusing the materials together or by grinding them in a colloid mill. The preparations may be used as such or the admixed substance may be eliminated before use by means of solvents without destroying the subdivision. For example a 20% aqueous paste of a dyestuff, such as that obtained by coupling diazotised *m*-nitro-*p*-toluidine with acetoacetanilide, is well stirred with an alkaline solution of a fatty acid, colophony, copal, or an alkali-soluble artificial resin, and the resulting mixture is acidified with hydrochloric acid, filtered, washed, and dried.

Manufacture of azo dyes. British Dyestuffs Corp., Ltd., K. H. Saunders, and H. Goodwin (E.P. 242,061, 22.10.24).—Azo dyestuffs yielding fast pink to bluish-red shades on printing with chrome mordants on calico, are obtained by coupling diazotised 1-amino-2-hydroxy-3-carboxynaphthalene-6-sulphonic acid with pyrazolones, preferably those containing one or more carboxyl groups, such as 3′-carboxy-1-phenyl-3-methyl-5-pyrazolone, 3′-oxamidophenyl-3-methyl-5-pyrazolone, and 3′-carboxyphenyl-3-carboxy-5-pyrazolone. 1-Amino-2-hydroxy-3-carboxynaphthalene-6-sulphonic acid is obtained by sulphonating β-hydroxynaphthoic acid, coupling the product with azobenzene, and reducing the azo compound.

L. A. Coles.

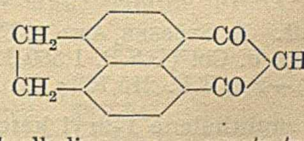
Orthohydroxyazo dye. O. Kaltwasser, H. Kirchhoff, and H. Oehrn, Assrs. to A.-G. f. Anilin-Fabr. (U.S.P. 1,556,329, 6.10.25. Appl., 15.5.25).—A sulphonated *o*-hydroxy-aromatic amine is diazotised and coupled with an unsulphonated 1-naphthyl-3-methyl-5-pyrazolone to yield wool dyestuffs, the after-chromed tints of which, and those obtained by dyeing in the presence of a chrome-mordant, are orange to bluish-red and are fast to light and stoving. For example 1-β-naphthyl-3-methyl-5-pyrazolone is coupled with 4-nitro-2-aminophenol-6-sulphonic acid. The product in presence of a chrome-mordant gives orange tints on wool.

T. S. Wheeler.

Production of dyestuffs [from glycosine]. K. Lehmstedt (G.P. 414,962, 3.8.22).—The *nitro-compound*, $C_6H_5O_{10}N_7$, obtained by nitrating glycosine (di-iminazolyl), is treated with reducing agents. The dyestuff, $C_6H_5O_7N_6,2NH_3$, obtained using concentrated ammonium sulphide as reducing agent, yields on wool and silk yellowish-brown shades, and that obtained using sodium hyposulphite yields on wool grey to black shades.

L. A. Coles.

Manufacture of 1:4:5:8-naphthalenetetracarboxylic acid and its derivatives. Farbw. vorm. Meister, Lucius, u. Brüning (E.P. 240,859, 2.10.25. Conv., 2.10.24. Not yet accepted).—Naphthalene-1:4:5:8-tetracarboxylic acid and its derivatives are obtained by condensing acenaphthene, or its derivatives having free *peri*-positions, with malonyl chloride and oxidising the *peri*-acenaphtheneindandiones so obtained. For example acenaphthene is condensed with malonyl chloride in presence of carbon disulphide and aluminium chloride, and the resulting *peri*-acenaphtheneindandione of the formula



oxidised with alkaline permanganate to naphthalene-1:4:5:8-tetracarboxylic acid.

Production of vat [perylene] dyestuffs. Kalle u. Co. A.-G., Assees. of M. Schmidt and W. Neugebauer (G.P. 415,711, 2.5.22. Addn., to 386,057).—The dyestuffs are obtained by treating perylenetetracarboxylic acid monoimide or its derivatives (*cf.* E.P. 201,786; J., 1923, 968 A) with ammonia or with primary aliphatic or aromatic amines. For example, the dyestuffs obtained by heating the monoimide with aniline and with *p*-chloroaniline yield on cotton from the vat red shades fast to chlorine, and bluish-red shades, respectively. L. A. Coles.

Production of β-phenyl-β-hydroxypropiono-*o*-carboxylic anhydrides. Chem. Fabr. vorm. Weiler-ter Meer (G.P. 416,073, 13.12.23).—The compounds, which are of use as intermediates in the manufacture of dyestuffs and drugs, are produced by the action of sulphuric acid upon *o*-cyanocinnamic acid or its derivatives (*cf.* G.P. 411,955; B., 1925, 693). For example, *o*-cyanocinnamic acid, m.p. 137°, is boiled for 5 hrs. with 30% sulphuric acid; *benzhydrylaceto-o-carboxylic anhydride* (*β-phenyl-β-hydroxypropiono-o-carboxylic anhydride*), m.p. 148—149°, crystallises out on cooling. The isomeric *o*-cyanocinnamic acid, m.p. 254°, remains unchanged during the treatment, and if mineral acids other than sulphuric acid be used, the acid of m.p. 137° is transformed into the isomeride of m.p. 254°. 4-Hydroxy-2-cyanocinnamic acid (*loc. cit.*) is converted into *4-hydroxybenzhydrylaceto-2-carboxylic acid*, m.p. 220—222°, by boiling with hydrochloric acid, *d* 1·162, for 6 hrs. under a reflux condenser.

L. A. Coles.

Production of dihalogendiphenylmethanedicarboxylic acids. H. Weil (G.P. 416,544, 6.1.23). —The compounds are produced by the condensation below 40° of *o*- and *p*-halogenbenzoic acids with formaldehyde or compounds yielding it. For example, trioxymethylene is stirred with a solution of *o*-chlorobenzoic acid in concentrated sulphuric acid at 15° until it has dissolved. After keeping for 72 hrs., the solution is poured into water, and uncombined *o*-chlorobenzoic acid is removed by boiling. The *dichlorodiphenylmethanedicarboxylic acid* formed has m.p. 274°, and the *isomeride* produced from *p*-chlorobenzoic acid has m.p above 300°. The products are of use in the manufacture of dyestuffs and drugs. L. A. Coles.

Manufacture of [triarylmethane-azo] dyestuffs containing chromium. Soc. of Chem. Ind. in Basle (E.P. 231,446, 2.3.25. Conv., 28.3.24).—See U.S.P. 1,551,073; B., 1925, 875.

Manufacture of [azo] dyestuffs. O. Y. Imray. From Soc. of Chem. Ind. in Basle (E.P. 242,867, 30.3.25).—See U.S.P. 1,549,901; B., 1925, 875.

Azo dyestuff. R. Stüsser, Assr. to Farbenfabr. vorm. F. Bayer u. Co. (U.S.P. 1,560,949, 10.11.25. Appl., 15.4.24).—See E.P. 215,769; B. 1925, 623.

4-Hydroxynaphthalene 1-aryl ketones. G. de Montmollin, E. Reber, G. Bonhôte, and J. Spieler, Assrs. to Soc. of Chem. Ind. in Basle (U.S.P. 1,552,472, 8.9.25. Appl., 30.1.23).—See G.P. 378,909; J., 1923, 1123 a.

V.—FIBRES; TEXTILES; CELLULOSE; PAPER.

Retting of flax with *Plectridium pectinovorum* (*Bac. amylobacter*, A.M. et Bredemann) and *Bacillus felsineus*, Carbone. G. Ruschmann and W. Bavendamm (Zentr. Bakt. u. Parasitenk., Abt. II., 1925, **65**, 43—58; from Chem. Zentr., 1925, II., 1687; *cf.* B., 1925, 876).—New evidence is brought forward that in the retting process as carried out in Germany, Carbone's bacillus takes no part in the fermentation of pectin and, even if used in pure culture, succumbs to the competition of the amylobacteria. Possible causes of this difference between German and Italian retting are discussed.

C. T. Gimingham.

Comparison between bamboo cellulose and cotton cellulose. G. Kita and K. Azami (Cellulose Ind., Tokyo, 1925, **1**, 162–164).—The maximum yield of cellobiose octa-acetate by Klein's method (*cf.* J., 1912, 713) obtained from bamboo cellulose prepared by chlorination was 70·82% (m.p. 220°), corresponding with 33·84% of cellobiose, after acetolysis for 7 days. The yield of cupric-reducing sugar obtained by Ost's method of total hydrolysis (*cf.* J., 1910, 688) corresponded with 97·5% of the theoretical value calculated as dextrose, and 90·4% of the theoretical quantity of crystallised dextrose was recovered. Hence the constitution of bamboo cellulose is similar to that of cotton cellulose.

J. F. Briggs.

Constituents of bamboo. K. Azami and S. Sengoku (Cellulose Ind., Tokyo, 1925, **1**, 157—161). —Analysis of raw bamboo stems including knots showed for a one-year old stem: Cellulose 51·7% and lignin 25·05% in the upper portion, 52·0 and 25·06% in the middle, 52·0 and 29·22% respectively in the lower portion. A three-year old stem showed similarly 52·15 and 26·05% in the upper portion, 53·1 and 28·26% in the middle, and 53·4 and 26·63% in the lower. The figures are expressed on dry weights and those for the cellulose on material previously extracted with benzene. Pentosan (xylan) ranged between 18 and 20%. Values for ash ranged from 1·65 to 2·02%; benzene extract, from 0·19 to 0·55%; alcohol extract, from 2·59 to 5·26%, the values for these extracts being highest in the upper portion of three-year old stems. Pectin varied from 0·0008 to 0·0360% and methyl value from 2·616 to 2·841%. J. F. Briggs.

Action of highly concentrated hydrochloric acid on cellulose.—K. Atsuki (Cellulose Ind., Tokyo, 1925, **1**, 53—61).—Cotton cellulose was treated at 10° with 100 times its weight of hydrochloric acid at 40, 41, 43, and 45% strength, and the course of the hydrolysis was followed by measurements of viscosity and specific rotatory power. The increase in rotation is more rapid the higher the concentration of the acid. The rotation–time curves show two points of deflection, the first after about 5 hrs. with 45% acid or 10 hrs. with 40% acid and the second after 15 hrs. with 45% acid or 30 hrs. with 40%. The viscosity falls rapidly along the first step of the specific rotation curve and remains constant afterwards. The addition of 1% of zinc chloride or 0·5% of sodium chloride to the acid retards the solution of the cellulose and inhibits to some extent the hydrolysis. The addition of 0·5% of calcium chloride suppresses the solvent action of the hydrochloric acid, the cellulose being disintegrated to a powdery form after a few days. The solution of cellulose is considered to take place by its association with the hydrochloric acid in virtue of its OH-groups reacting as water so long as the concentration of the acid is such that it is still unsaturated with water of hydration ; dispersion of the cellulose under these conditions is progressive. The end product of the hydrolysis is dextrose, the intermediate products being colloids and then crystalloids in stages. By precipitation at an early stage after solution the cellulose is obtained in a modified form very highly hydrated. It is physically unsuitable for nitration or acetylation, but can be centrifuged and converted into viscose. J. F. Briggs.

Factors in the caustic soda absorption of cellulose and their effects on the resulting viscose. M. Numa (Cellulose Ind., Tokyo, 1925, 1, 87—101).—In the preparation of alkali-cellulose for viscose, the optimum results as regards the viscosity of the viscose solution and the physical quality of the regenerated cellulose are obtained when the steeping is performed under the following conditions : concentration of sodium hydroxide, 15% ; temperature of steeping bath, 20° ; time of immersion 24 hrs. The surface area of the sample of cellulose influences the absorption of sodium hydroxide, maximum absorption being obtained with pieces of 0·5—1 sq. cm. ; stirring does not influence the absorption. The absorption of sodium hydroxide is increased by the addition of sodium salts, the carbonate having the most pronounced effect and the sulphate the least ; the bicarbonate and the phosphate cause a decrease in the absorption. It is suggested that the cellulose does not absorb the undissociated sodium hydroxide molecules but the sodium ion.
J. F. Briggs.

Determination of moisture in fibrous materials. C. G. Schwalbe (Ver. Zellstoff- u. Papier-Chem., Hauptversamml., 1924, 121—123).—The usual method for the determination of moisture is by heating in a weighing bottle at 105°. Care must be taken that the temperature is equalised in all parts of the oven, and the weighing bottles should not be directly in contact with the metal shelves of the oven. Good exposure of the loosely packed material should be ensured. This method is not accurate in the case of materials containing soluble carbohydrates, such as pectin, or those which are liable to lose volatile constituents other than water, such as resinous woods. The time required is 4—8 hrs. By the use of a vacuum weighing-bottle the time may be shortened and the temperature of the water-oven will suffice. With suitable apparatus the use of vacuum may be further supported by the presence of phosphorus pentoxide. The method of distillation in the presence of a hydrocarbon gives results of sufficient accuracy ; it is particularly suitable for special cases, *e.g.*, where large samples must be taken or where resinous or fatty materials have to be dealt with. Obermiller recommends for the drying of large bulk samples a water-jacketed oven at 95—100°, a current of air of normal dryness, derived from a source free from the products of combustion, being circulated through the material. This is particularly desirable in the drying of compact materials such as wood pulp. J. F. Briggs.

Ungerer's system for digesting wood by the soda process. Jenke (Ver. Zellstoff- u. Papier-Chem., Hauptversamml., 1924, 177—180).—Ungerer's process is still being worked at the Stuppach pulp mill with a few modifications. The digester plant consists of a battery of 9 well-insulated digesters inter-connected both top and bottom, of which 5 constitute a working series, while the others are in course of charging and discharging. The digesters have a capacity of 2·07 cb.m. of wood. The caustic liquor (5·6—6·0% of sodium hydroxide) is contained in a furnace-heated boiler consisting of a tubular preheater and horizontal cylindrical body, which are directly under fire, and an upper cylindrical reservoir, containing both liquor and steam, not directly exposed to the furnace gases. The liquor is forced under a steam pressure of 6·6—8 atm. from this reservoir through the battery of digesters in such a way that the fresh liquor enters the digester which is next ready to be discharged and the most exhausted liquor enters the digester most recently filled. As a digester charge of spent liquor is drawn off for transfer to the recovery plant, the liquor in each of the other digesters is passed one stage forward, while the digester ready for discharge is drained under the steam pressure from the liquor boiler. The pulp from this digester, saturated with practically clean fresh liquor, is conveyed to a system of Shanks' lixiviating tanks, the ultimate washings from which are returned to the caustic liquor plant. Thus, no washings are treated in the soda-recovery system. The 9 digesters give 24 charges per 24 hours. The make-up in the soda-recovery plant consists partly of sodium sulphate and partly of carbonate ; excess of sulphate in the make-up causes corrosion in the liquor preheater. The consumption of chemicals per 100 kg. of cellulose is 4·04 kg. of sodium carbonate, 7·08 of Glauber's salt, and 25·6 kg. of quicklime.
J. F. Briggs.

Reducing power of sulphite-cellulose waste liquor. Kotibhasker.—See VI.

Linoleum and triolin. Simon.—See XIII.

Patents.

Degreasing raw wool. A. M. Bruckhoff (E.P. 241,314, 28.7.24).—Raw wool containing 10—30% of natural fat is degreased by extraction with warm (not boiling) acetone, the resulting wool having a fat content of 2—3%. Degreasing may be effected by successive extraction of wool with 3—5 times its weight of cold acetone or by passing the wool successively during 15 mins. through a series of extraction chambers containing acetone, the temperature in the last chamber preferably being 30—40°. The fats extracted by cold and warm (30—40°) acetone have m.p. 15—25° and 60°, iodine values 22—28 and 10, and saponification values 108—115 and 70 respectively. It is advantageous to dry the wool till it contains 2—3% of moisture before degreasing. The solubilities of wool wax and those constituents of wool fat having a low melting point are increased six- and two-fold respectively when the temperature of the acetone used for extraction is raised by 25°; the residual fat content of the extracted wool is controlled by the temperature of extraction. A. J. Hall.

Manufacture of cellulose acetate. L. A. Levy (E.P. 240,624, 9.4.24).—Cellulose acetate soluble in acetone is rapidly prepared by treating cellulose (containing 6—7% of moisture) with a mixture containing acetic acid, acetic anhydride, a condensing agent, such as sulphuric acid, and a catalyst, such as the acetate or sulphate of vanadium, nickel, cobalt, or chromium. For example, 2·5 lb. of cellulose are kneaded at a temperature not exceeding 15° with a mixture containing 5 lb. of acetic acid, 5 lb. of acetic anhydride, 0·2 lb. of sulphuric acid, and 2·5 lb. of chromium acetate until a transparent, viscous liquid free from fibres is obtained, the mixture being then maintained at 30° until the resulting cellulose acetate is freely soluble in acetone; the preparation is complete within 18 hrs. Salts of magnesium, aluminium, sodium, antimony, uranium, manganese, cerium, tin, niobium, and thorium are not satisfactory catalysts. A. J. Hall.

Treating cellulose acetate. E. S. Farrow, jun., Assr. to Eastman Kodak Co. (U.S.P. 1,557,147, 13.10.25. Appl., 20.1.25).—Cellulose acetate (soluble in chloroform) is dissolved in a solution of phosphoric acid and the partially hydrolysed. A. J. Hall.

Preparation of flocculent cellulose products. Wolff u. Co., Assees. of E. Czapek and R. Weingand (G.P. 415,588, 17.6.22).—Wood-pulp, paper, and similar fibrous materials are mechanically disintegrated in the presence of dispersing (not swelling) agents, such as ether, alcohol, and chloro-derivatives of acetylene, under such conditions that no decomposition of the fibres occurs. The soft products thereby obtained readily absorb acids, bases, and salts, and are particularly suitable for the manufacture of nitrocellulose, wadding, and viscose, yielding solutions of the last-named which are very easily filtered. A. J. Hall.

Production of resin (from pulp mill black liquor). F. E. Greenwood, Assr. to Pine Waste Products, Inc. (U.S.P. 1,560,420, 3.11.25. Appl., 25.8.20).—The resinous components of pulp-mill black liquor are treated with an acid which will liberate the resin and a solvent which will remove it from the aqueous liquor. The resin solution is then treated with a second solvent, immiscible with the first, to remove the resin from the accompanying impurities. A. R. Powell.

Utilisation of waste material from de-inking of paper in making paper. L. E. Granton (E.P. 240,924, 10.7.24).—Waste fibrous material (usually containing particles of lampblack) obtained by well known methods from the water used for washing de-inked printed paper (*cf.* E.P. 222,160; B., 1924, 977) is mixed with other paper pulp and suitable filling agents, such as china clay and rubber latex, and then converted into paper which is suitable for wrappers, handbills, and tickets. The strength of the resulting paper is not materially diminished if its content of wastage does not exceed 30%, although papers containing 60% of wastage may be prepared (*cf.* G.P. 411,334; B., 1925, 842). A. J. Hall.

Sizing paper. J. Janser (G.P. 415,675, 30.11.22. Conv., 7.2.22).—Paper is sized with 8—20% of a colloidal or highly dispersed solution (prepared by means of a colloid mill or similar apparatus) of wood or other cellulosic material. The pores of the paper are filled and it acquires transparency and a high tensile strength. A. J. Hall.

Apparatus for removing deposited impurities from textile or metallic fabrics, braided or felted materials used in the manufacture of paper. W. Fuhrmann (G.P. 416,281, 14.3.23).—The materials are subjected to electro-osmosis while maintained stationary or moving between moving or stationary electrodes in a washing trough, the impurities being removed and deposited on the anode by cataphoresis. A. J. Hall.

Gutter or channel for treating artificial threads or yarns, particularly imitation-silk yarns, with acids or an acid-containing liquor. E. Elsaesser and W. zur Löwen, Assrs. to Amer. Bemberg Corp. (U.S.P. 1,561,445, 10.11.25. Appl., 29.10.23).—See E.P. 209,376; B., 1924, 251.

Production of [mechanical] wood-pulp. C. J. Sternkopf (E.P. 234,120, 14.5.25. Conv., 15.5.24).

Converting methyl sulphide into carbon tetrachloride etc. (G.P. 416,603).—See XX.

VI.—BLEACHING; DYEING; PRINTING; FINISHING.

Reducing power of sodium hyposulphite in alcoholic solution [and its use for bleaching silk]. J. Pokorny (Rev. gén. Mat. col., 1925, 29, 288).—The increased reducing power of sodium hyposulphite in aqueous alcoholic solution previously described (*cf.* B., 1925, 127) may be used for bleaching natural silk. Air-dry silk is thoroughly bleached (cotton dyed with indigo is simultaneously decolorised so that its colour is not restored by oxidation with a dichromate) by immersion for ¾ hr. in a mixture containing 100 g. of sodium hyposulphite, 2 litres of denatured alcohol, and 600 c.c. of water, and further quantities of silk may be bleached afterwards in the remaining liquor after successive additions of suitable quantities of water (about 300 c.c.) until the sodium hyposulphite has completely dissolved. A yellow acidic substance having an agreeable odour and soluble in water is obtained by evaporation of the spent bleaching liquor, and it is re-precipitated from its aqueous solution by addition of ammonia or hydrochloric acid. Copper

is stained black rapidly and strongly by immersion in an aqueous solution of sodium hyposulphite, but only slowly in a similar solution containing alcohol.
A. J. Hall.

Reducing power of sulphite[-cellulose] waste liquor, and its use in dyeing and bleaching. M. G. Kotibhasker (J. Soc. Dyers and Col., 1925, 41, 361—362).—The waste liquor used was that left after digesting rasped Scotch fir for 14—16 hrs. at 160° in 6 times its weight of a solution containing 1·4% CaO and 4·5% SO_2. The final liquor had *d* 1·050, and contained 9·9% of total solids (CaO 0·63%). The liquor produces a satisfactory indigo vat, 17·4–20 c.c. of it being equal to 1 g. of hyposulphite in reducing power. Calico can be dyed very evenly in such a vat. Fabrics dyed with indigo can be stripped by immersion in a warm bath of the waste liquor and sodium hydroxide and the indigo regenerated and recovered to the extent of 50—63%. Indanthrene, Flavanthrene, and Sulphur Black are reduced by the waste liquor, but with Para Red, reduction is only partial.
A. Coulthard.

Products used for insoluble azo colours. Rowe and Levin.—See IV.

Patents.

Bleaching wool. Chem. Fabr. Griesheim-Elektron, Assees. of L. Löchner (G.P. 415,583, 1.8.23).—Wool is bleached by treating it for 2—5 mins. with a cold or warm solution of sodium bisulphite of 0·5—1·0° B. (*d* 1·003—1·007), then removing excess of the solution, and drying.
A. J. Hall.

Bleaching bristles. Chem. Fabr. Griesheim-Elektron, Assees. of L. Löchner and G. Köhler (G.P. 417,407, 25.6.24).—The usual bleaching treatment with peroxides is preceded by treatment of the bristles with a solution containing free chlorine (*e.g.*, an acidified solution of bleaching powder or sodium hypochlorite, or chlorine water), the bleaching process being thereby shortened and an improved white colour obtained.
A. J. Hall.

Treatment of cellulosic materials, fibres, yarns, and fabrics with liquids [sulphuric acid]. Know Mill Printing Co., Ltd., T. L. Mort, and F. W. Weeks (E.P. 241,246, 20.5.24).—Pattern effects on cotton, linen, and similar material are obtained by printing or spraying it with a mixture containing sulphuric acid and methyl alcohol, acetone, or acetic acid or their homologues, these latter substances having a retarding effect on the rapidity but not effectiveness of sulphuric acid on cellulose. For example, transparent effects accompanied by negligible decrease of strength are obtained by treating cotton fabric with a mixture containing 25 g. of acetic acid and 75 g. of sulphuric acid at 15° for 30 secs. or with a mixture containing 46 g. of alcohol and 196 g. of sulphuric acid at 15° for 60 secs. The treatment may be preceded or followed by mercerisation or calendering.
A. J. Hall.

Dyeing animal fibres and fabrics of a protein nature. S. W. Wilkinson (E.P. 242,027, 25.6.25).—After exposure to the simultaneous action of ozone and ammonia, such materials as wool, fur, bristles, silk, leather, and feathers have an increased affinity for all classes of dyestuffs and the resulting dyeings have greater fastness to light, washing, and acids. A satisfactory method of treatment consists of impregnating wool or similar material with a 5% solution of ammonia, removing excess of liquor by hydro-extraction, and then exposing it for several hours to a current of moist ozonised air containing 1 pt. of ozone per 1000 pts. of air, subsequently dyeing it or drying it at a low temperature (the increased affinity for dyestuffs is retained for a considerable time). Acidity produced during the treatment with ozone is neutralised by repeated treatment of the material with ammonia. White furs sometimes acquire a silky lustre when subjected to the treatment described above.
A. J. Hall.

Dyeing leather. Kalle u. Co. A.-G., Assees. of K. Luck and R. Zahn (G.P. 417,209, 28.5.24).—Leather is dyed with acid or direct dyestuffs in the presence of salts of metals such as copper, zinc, iron, aluminium, and titanium, and of substances which hinder the precipitation in the dye-bath of compounds of the metal with the dyestuff, suitable substances including lactates, tartrates, and sulphite-cellulose waste liquor.
L. A. Coles.

Drying, lustring, and finishing machines for fabrics. Calico Printers' Assoc., Ltd., and F. Farnworth (E.P. 242,749, 10.10.24).

Dyeing machinery. J. Dean (E.P. 242,790, 15.11.24).

Apparatus for treating vegetable, animal, or artificial fibres with dyes or other liquids. J. Schlumpf (E.P. 242,857, 14.3.25).

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

Chemistry of the lead chamber process [of making sulphuric acid]. F. Raschig (Z. angew. Chem., 1925, 38, 1001—1010).—Reprint of the author's paper published in this J., 1911, 166.
C. Irwin.

Mechanical condition of ammonium sulphate. A. D. Cummings (Gas J., 1925, 172, 357—359).—Ammonium sulphate may be discoloured by the black slime which accumulates in saturators. The insoluble portion of a typical sample contained 35·0% of copper sulphide, 12·2% of iron, 30·1% of carbon, and 10·1% of tar. The copper was derived from the centrifugal basket. The caking of dry salt may be minimised by the elimination of free sulphuric acid, lime, soda, free ammonia, and pyridine, by operating the saturator so as to produce uniform crystals of larger size, by the adoption of moderate drying temperatures, and by the elimination of dust.
H. Hollings.

Control of electric furnaces. Schlumberger.—See XI.

Iron compounds. Miller.—See XXIII.

Patents.

[Sulphur dioxide for] sulphuric acid process. Grasselli Chemical Co., Assees. of J. C. Boertlein (E.P. 240,801, 19.8.25. Conv., 4.10.24. Not yet accepted).—Sulphur dioxide is produced by using sulphur as fuel in an internal-combustion engine, which may be of the Diesel type. The exhaust gases may be passed into a chamber or burner in which any residual sulphur is oxidised, and the sulphur dioxide, after purification, if this be necessary, and possibly adjusting its temperature, may be converted into sulphuric acid. To avoid corrosion the air supplied to the engine is dried, and the sulphur may be introduced into the cylinder after being melted by means of superheated steam or by the heat of the combustion gases. The melting pot may be let into a wall of the combustion chamber in which the residual sulphur is burned.

Method of manufacturing sulphuric acid. J. V. Skoglund (U.S.P. 1,559,292, 27.10.25. Appl., 25.3.24).—In the lead chamber process for the manufacture of sulphuric acid, the gases leaving the last chamber pass in succession through a small preliminary Gay-Lussac tower, a water scrubber, and a final Gay-Lussac tower. Nitrogen peroxide is decomposed by the water, yielding nitric acid in solution and nitric oxide. The latter, after re-oxidation, is absorbed in the last tower. C. Irwin.

Production of sulphuric acid in towers. R. Vetterlein, and Chem. Fabr. zu Schöningen (G.P. 416,859, 29.11.24).—Apparatus for the manufacture of sulphuric acid comprises a Glover tower and one or more reaction towers packed with filling material, in which both oxidation and absorption take place. The reaction towers are situated close to one another, and their total cross-sectional area is many times that of the Glover tower. L. A. Coles.

Producing soluble carbonates or hydroxides from insoluble carbonates, oxides, or hydroxides. A. F. Meyerhofer, Assee. of E. de Haën A.-G. (E.P. 219,971, 24.7.24. Conv., 2.8.23).—To prepare for example sodium carbonate from calcium carbonate, the latter is stirred in water for some hours with sodium fluoride. The solution is filtered from the precipitate of calcium fluoride, the latter washed, and the solution and washings are evaporated. The calcium fluoride is dissolved in dilute hydrochloric acid and heated with sodium chloride and silicon fluoride, yielding sodium silicofluoride. This is decomposed by heating into sodium fluoride and silicon fluoride, which are returned to the cycle. C. Irwin.

Process of making alkali [sodium] carbonate. G. N. Libby, Assr. to Nat. Magnesia Manuf. Co. (U.S.P. 1,558,901, 27.10.25. Appl., 25.5.24).—Pulverised magnesia is added to a saturated solution of natural soda (trona). H. Royal-Dawson.

Separating hafnium and zirconium. N. V. Philips Gloeilampenfabr., Assees. of D. Coster and G. Hevesy (E.P. 219,983, 29.7.24. Conv., 30.7.23).—The basic salts of zirconium and hafnium, in which the basic radical contains more oxygen than ZrO or HfO, are separated by fractional crystallisation. Thus a mixture of the oxychlorides, $Zr_2O_3Cl_2$, $5H_2O$ and $Hf_2O_3Cl_2$, $5H_2O$ (in the precipitation of which iron, aluminium, and the like remain in the mother liquor) is dissolved in 50 pts. by weight of alcohol, and 125 pts. by weight of ether are added. The zirconium becomes concentrated in the precipitate so produced and the hafnium in the mother liquor. Acetone may also be used as precipitant. C. Irwin.

Production of aluminium chloride and alumina. Chem. Fabr. Griesheim-Elektron (E.P. 240,834, 29.9.25. Conv., 2.10.24. Addn. to 205,563. Not yet accepted).—The ferruginous liquors obtained in carrying out the process described in the chief patent (J., 1923, 1222 A) are diluted and treated with aluminous material such as burnt clay to remove most of the iron and enrich the liquors in aluminium chloride. The liquors can then be evaporated as in the process of the chief patent, and the clay is washed with water to remove the iron hydroxide, after which the clay may be used with other raw material in the process.

Catalytic synthesis of ammonia. S. G. S. Dicker. From H. Harter and A. T. Otto (E.P. 241,771, 21.1.25).—Two catalyst chambers are used, the inner one working at high pressure, *e.g.*, 500 atm., the outer one in the form of a jacket or a coiled tube at a lower pressure, *e.g.*, 300 atm., the gas stream being divided between the two. The inner chamber contains the usual heating elements, the outer one being heated by conduction only. The continuity of the process is secured by regulating the pressure in the inner chamber or the relative gas velocities in the two. The heat of reaction at the higher pressure is thus economically used, whilst the structural difficulties are reduced by the partly counter-balancing outside pressure. The ammonia produced can be liquefied by expansion only. C. Irwin.

Catalytic apparatus for the synthesis of ammonia. Synthetic Ammonia and Nitrates, Ltd., and F. H. Bramwell (E.P. 241,817, 4.5.25).—The catalyst chamber is surrounded by a heat interchanger consisting of two coaxial tubes wound into two spirals. The exit gases pass through the inner tube and the entering gases through the outer annulus. The remainder of the space outside the catalyst chamber is tightly packed with asbestos or other lagging. When the inner chamber is at a temperature of 600° the temperature of the outer wall does not exceed 100°, and ordinary mild steel may be used for its construction. C. Irwin.

Manufacture of titanium sulphate. H. N. McCoy, Assr. to Lindsay Light Co. (U.S.P. 1,559,113, 27.10.25. Appl., 14.6.24).—Basic titanium sulphate is treated with fuming sulphuric acid to form the soluble sulphate. H. Royal-Dawson.

Production of easily filtered, hydrated titanic acid.—Deutsche Gasglühlicht-Auer-Ges. (G.P.

417,726, 26.4.22).—Hydrated titanic acid is precipitated by passing steam into heated solutions containing titanic salts, *e.g.*, titanic sulphate, the steam being superheated to such a temperature that on passage into the boiling solution, its temperature falls at least 10°. L. A. Coles.

Elimination of iron from solutions of leucitic rocks. U. Pomilio and F. Giordani, Assrs. to Pomilio Bros. Corp. (U.S.P. 1,559,179, 27.10.25. Appl., 25.8.22).—Leucitic rock is treated with acid and after removing the silica, the solution is subjected to electrolysis to precipitate the iron. H. Royal-Dawson.

Producing alkali xanthates. R. B. Crowell and G. F. Breckenridge, Assrs. to Western Industries Co. (U.S.P. 1,559,504, 27.10.25. Appl., 18.5.25).—Alkali xanthates are produced by interaction of alkali hydroxide, alcohol, and carbon disulphide, in a liquid hydrocarbon medium which is chemically inert to the remaining ingredients. H. Royal-Dawson.

Manufacture of crystallised zinc sulphide. G. de Hédouville and P. Pipereaut (U.S.P. 1,560,380, 3.11.25. Appl., 2.1.24).—Solid oxidised zinc compounds are treated with hydrogen sulphide at a temperature between 250° and a red heat. A. R. Powell.

Production of strontium oxide from strontium carbonate. Chem. Fabr. Coswig-Anhalt G.m.b.H., and W. von Dieterich (G.P. 417,019, 23.4.24. Addn. to 396,214).—The process described in the chief patent (*cf.* E.P. 191,215 ; J., 1923, 451A) is used for the production of high-percentage strontium oxide. L. A. Coles.

Production of pure lithium compounds from minerals containing lithium, especially from lithia mica. Metallbank u. Metallurgische Ges., C. von Girsewald, and H. Weidmann (G.P. 417,169, 20.7.22. Addn. to 413,721).—In the process described in the chief patent (cf. B., 1925, 757), the lithium fluoride is decomposed by fusion with salts or compounds of metals, the fluorides of which are less soluble than lithium fluoride, *e.g.*, it is heated to fusion with calcium carbonate and a quantity of calcium oxide necessary for the formation of lithium oxide. L. A. Coles.

Extraction of crude barium sulphide and similar substances. P. Kircheisen (G.P. 417,339, 9.3.24).—The material is extracted in a closed rotating vessel provided with a perforated false bottom, so that the material can be extracted and subsequently washed with acid in the vessel. L. A. Coles.

Catalytic production of hydrogen. Synthetic Ammonia and Nitrates, Ltd., Assees. of W. Schultze (E.P. 220,649, 16.8.24. Conv., 16.8.23). —A catalyst of the ferric oxide type for the reaction $CO+H_2O=CO_2+H_2$ is prepared in a coherent form by the use of high pressure on the dry material without any binder. The raw material may be the precipitate produced by the addition of ammonia or of magnesium carbonate to a nitric acid solution of iron to which some potassium dichromate may be added. The precipitate is dried, ignited at 700°, and without screening, compressed into 0·5 g. discs in a Stokes tablet machine. These tablets do not disintegrate under the conditions of the reaction, are sufficiently porous to function efficiently as a catalyst, and can be handled without special precautions. C. Irwin.

Production of sulphuric acid. H. Klencke, Assr. to Amer. Lurgi Corp. (U.S.P. 1,561,985, 17.11.25. Appl., 28.3.24).—See G.P. 398,318 ; B., 1924, 942.

Producing hydrocyanic acid from sulphocyanic acid or its compounds. J. A. Du Bois (E.P. 214,999, 23.4.24).—See G.P. 410,418 and 411,104 ; B., 1925, 757.

See also pages 2, **Evaporating salt solutions** (E.P. 242,018). 5, **Purifying sulphided alkaline solutions** (E.P. 241,221) ; **Eliminating hydrogen sulphide from gases** (E.P. 241,248 and 241,252). 17, **Recovering cyanogen** (E.P. 241,669). 27, **Carbamide** (E.P. 241,123).

VIII.—GLASS; CERAMICS.

Colour imparted to glass by fluorine compounds. K. Fuwa (J. Jap. Ceram. Assoc., 1924, 32, 280—294 ; *cf.* B., 1925, 99).—Cryolite, sodium silicofluoride, and sodium fluoride are approximately equally effective in producing opalescence in glass. Calcium fluoride is less effective. The milky colour is more easily produced in potash glasses than in soda glasses, and an increase in the content of alkalis favours the coloration. Glasses containing bivalent heavy metals are more susceptible to the coloration than those containing alkaline-earth metals. The author supports the view that the opalescence is due to colloidal silica produced by the action of fluorine compounds on silica ; fluorides of alkaline-earth or other bivalent metals would, however, contribute to the effect in glasses containing these metals. Addition of arsenious oxide has no effect, and of potassium nitrate little effect on the action of fluorine compounds in producing opalescence. S. Kondo.

Colour imparted to glass by sulphur and its compounds. K. Fuwa (J. Jap. Ceram. Assoc., 1924, 32, 314—327).—Addition of sulphur generally produces a darker colour in potash glasses than in soda glasses. The batches containing sulphur foam remarkably, and the glasses are generally brittle. The colours produced by antimony pentasulphide are somewhat lighter than those given by sulphur. Glasses of the composition $K_2O,CaO,3SiO_2$, $K_2O,ZnO,3SiO_2$, and $K_2O,CaO,0{\cdot}5B_2O_3,3SiO_2$ were coloured a beautiful yellow by 1% of the sulphide, the glasses $R_2O,PbO,3SiO_2 + 1\%\ Sb_2S_5$ and $R_2O,PbO,0{\cdot}5B_2O_3,3SiO_2 + 0{\cdot}5$—$1\%\ Sb_2S_5$, formed light greenish alabasters ; lead was reduced in the latter glasses. Potash and borosilicate glasses tend to produce alabasters on addition of cadmium sulphide. The glasses, K_2O,

$CaO,0{\cdot}5B_2O_3,3SiO_2 + 5\%$ CdS and $K_2O,MgO,0{\cdot}5B_2O_3,3SiO_2 + 3$–$5\%$ CdS are coloured a fine yellow. The colouring action of potassium sulphide is much weaker than that of sulphur. Generally speaking, the sulphides are entirely or partially decomposed at high temperatures, and the sulphur set free, or the products of its reaction with bases, impart to the glasses colours varying from yellow to dark red. Sulphates, if formed, may produce alabasters or opalescent glasses. The action of sulphur is reduced by addition of potassium nitrate, the effect of the latter being greater in soda-glasses than in potash-glasses. Potassium nitrate also tends to produce sulphates in potash glasses, and hence to form alabasters. Arsenious oxide acts in a similar way to potassium nitrate, except that it produces an alabaster very rarely. S. Kondo.

Colour imparted to glass by selenium. K. Fuwa (J. Jap. Ceram. Assoc., 1924, 32, 327—342).—The colour given to glasses of the type $aR_2O,bRO,cSiO_2$ by elementary selenium is lighter when R_2O is Na_2O than when K_2O, and is brown in soda-glasses and pink or red in potash-glasses. Boric acid favours the development of pink. The colours of glasses of the composition $1{\cdot}3R_2O,RO,6SiO_2$ with $0{\cdot}1\%$ Se are: Na-Ca light brown, K-Ca dark red, Na-Mg brownish-pink, K-Mg light orange-pink, Na-Zn light greenish-blue, K-Zn orange, Na-Ba orange, K-Ba light pinkish-yellow, Na-Pb yellow, and K-Pb colourless. Potassium nitrate tends to counteract the effect of selenium, though its influence is slight. Potassium tartrate darkens the colour if RO is an alkaline earth, but has no effect when RO is a metal oxide. Arsenious oxide counteracts the effects of selenium. Soda-glasses are more susceptible to selenium than potash-glasses. S. Kondo.

Action of electrolytes on clays. S. Kondo (J. Soc. Chem. Ind. Japan, 1925, 1—10).—A theoretical paper in which an explanation of the author's results (*cf.* B., 1925, 849) is put forward based on the conception of an "ideal" clay as an ionisable kaolinic acid. Placticity is attributed to the mutual attraction of clay particles, which is opposed by the electrical repulsion set up as a direct consequence of the ionisation of kaolinates and kaolinic acid. Colloidal kaolinic acid produced by the hydrolysis of kaolinates and also by the action of acids on them plays an important rôle here, as it has enormous surface. S. Kondo.

Patents.

Plastic. W. Hoskins, Assr. to Economy Fuse and Manuf. Co. (U.S.P. 1,556,115, 6.10.25. Appl., 21.2.23).—A phosphate such as bone ash is mixed with quartz and treated with sulphuric acid to liberate phosphoric acid. On addition of calcium aluminate and water the aluminate acts on the phosphoric acid and rapid setting of the whole occurs. T. S. Wheeler.

Manufacture of articles from highly refractory materials. S. A. Myler (U.S.P. 1,559,275, 27.10.25. Appl., 7.10.24).—Graphite, pulverised soft coal, and petroleum oil are mixed to a putty, which is moulded to shape and heated to drive off the oil. The product is then dipped in tar and subsequently completely carbonised. C. Irwin.

Silica glass. L. B. Miller, Assr. to Gen. Electric Co. (U.S.P. 1,562,115, 17.11.25. Appl., 13.2.23).—See E.P. 189,926; J., 1923, 98 A.

Manufacture of chamotte bricks. S. E. Sieurin (U.S.P. 1,561,492, 17.11.25. Appl., 27.11.23).—See E.P. 218,495; B., 1924, 748.

IX.—BUILDING MATERIALS.

Curing concrete in a semi-arid climate. H. F. Gonnerman and C. L. MacKesson (Structural Materials Res. Lab., Lewis Inst., Chicago, Bull. 15, 1925. 37 pp.).—The best results from the point of view of strength and surface hardness for concrete cured in California (day temperature 30—35°, low humidity) are obtained by curing in wet earth. This maintains the moisture content of the concrete during the early stages of hydration about equal to the quantity of the original mixing water. There is no increase of strength when the curing is prolonged from 3 days to 7 or 14 days. Flake calcium chloride spread over the surface of the concrete does not give good results, as it absorbs water from the concrete itself, with corresponding loss of strength. Curing in air and with sodium silicate produced low strength and surface hardness; asphaltic paper was not so efficient as wet earth. The surface hardness of concrete measured by indentation methods is, in general, proportional to the transverse breaking strength. B. W. Clarke.

Patents.

Composition of matter hardened by metal chlorides. Granitite Manuf. Co., Assees. of H. J. Thompson (E.P. 228,847, 26.2.24. Conv., 6.2.24).—Calcined magnesite is mixed with powdered marble, fine silica sand, and finely ground quartz, with the addition of 6% by weight of the total of fibrous cellulose, such as sulphite pulp, wood pulp, etc. The mixture is gauged with magnesium chloride solution, which acts as a hardening agent. The material may be poured or pressed into moulds to form slabs, tiles, etc., which can be readily cut or nailed, and offer considerable resistance to buckling and warping. The mixture can also be applied as a plastering and possesses good thermal and electrical resistivity. B. W. Clarke.

Bituminous binding materials. L. S. van Westrum (E.P. 233,371, 8.11.23).—A bituminous waterproofing soap is prepared by saponifying a drying oil, preferably linseed oil, mixed with asphalt, by an alkali. Bitumen (30—50 pts.) is mixed hot with rosin (3—8 pts.) and linseed oil (3—8 pts.). Alkali lye (1 pt. of alkali to 3 pts. of water) is added, and mixing continued until saponification occurs. The product can be used for paving, briquette manufacture, etc. (Reference is directed, in pursuance of Sect. 7 (4), of the Patents and Designs Acts, 1907 and 1919, to E.P. 121,533.)
T. A. Smith

Bituminous emulsions. H. A. Mackay (E.P. 233,430, 8.2.24).—A bituminous emulsion miscible with water is prepared by mixing with hot bitumen about 5% of an emulsifying agent containing cholesterol, and adding hot water to the mixture. Wool fat is a suitable emulsifying agent. The emulsion can be used in road making, briquette manufacture, etc. T. A. Smith.

Insulating cement or mortar. L. Caldwell, Assr. to Celite Co. (U.S.P. 1,556,488, 6.10.25) Appl., 29.1.23).—A heat-insulating cement or mortar is obtained by mixing 85—90 pts. of powdered diatomaceous earth with 10—15 pts. of an organic adhesive, such as glue or casein, adding 5% of a salt, such as sodium chloride or carbonate, or a mixture of such salts, and mixing with water. The inorganic salt increases the osmotic pressure and distends the adhesive, so that less of the latter is required. A preferred composition contains 83 pts. of diatomaceous earth, 10 of glue, 5 of sodium carbonate, 2 of aluminium sulphate, and 350 of water. T. S. Wheeler.

Manufacture of fused cement and sulphur dioxide. G. Polysius (G.P. 416,592, 13.9.24).—Raw materials containing sulphur are burnt, either alone or with suitable admixtures, so that a cement is produced which resembles aluminous cement in its properties, having a high initial strength and being resistant to chemical influences. B. W. Clarke.

Producing cement. T. Fujiyama (U.S.P. 1,561,070, 10.11.25. Appl., 25.5.20).—See E.P. 168,406; J., 1920, 727 A.

Preservation of stone. A. P. Laurie (U.S.P. 1,561,988, 17.11.25. Appl., 8.4.24).—See E.P. 203,042; J., 1923, 1073 A.

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

Investigations on [cupola] burdens with briquettes of cast-iron and rusted and unrusted steel. O. Lechner (Stahl u. Eisen, 1925, 45, 1802—1809).—Additions of 5 to 30% of briquettes made of turnings of cast iron and of rusted and unrusted steel were added to a cupola charge of one-third of hæmatite and two-thirds of German No. 1 iron. With increasing addition of briquettes, the carbon and silicon content of the products decreased, the phosphorus remained constant, the sulphur increased, and the mechanical properties were improved. With the cast-iron briquettes the tensile strength reached a maximum with a 30% addition, the bending strength at 30%, the bending angle at 15%, and the impact value at 10%. With the rusted steel briquettes the properties named reached their maxima at 15%, 20%, 0%, and 15%, and with the clean steel briquettes at 25%, 20%, 20%, and 20% respectively. The fact that with the steel turnings the maxima did not occur at a 30% addition was due to the sulphur content of the product. The increase in sulphur was due to the great surface area of the turnings in contact with the coke. The cast-iron briquettes owing to their higher initial content took up less sulphur than the steel briquettes. In each series the Brinell hardness increased up to a 30% addition of briquettes. The machining properties were normal in all cases except for a 20% addition of rusted steel briquettes; in this case deposition of cementite made the metal difficult to machine. The addition of briquettes decreased the tendency to the formation of blowholes, and none of the samples solidified white. The metal made from clean steel briquettes was in general better than that obtained in the other cases. Photomicrographs showed that the tensile and impact test diagrams could be explained by the decrease in the amount of graphite, the appearance of cementite, the increase in pearlite, and decrease in ferrite in the structures throughout the series, in conjunction with the changes in the form of these constituents. The hardness curves were also explained by the hard constituents increasing throughout. The tests showed that in practice a 15% addition is the most advantageous, and that the mechanical properties can be deduced from the structure of the irons.

T. H. Burnham.

Constitution of iron. F. Wever (Physikal. Z., 1925, 26, 698—699; *cf.* B., 1925, 721).—A brief summary of our present knowledge of the allotropy of iron. The identity of the α and δ modifications of iron, first indicated by *X*-ray analysis, is confirmed by a study of the binary systems, iron–silicon and iron–tin. The solubility of carbon in γ-iron is regarded as due to the carbon atoms filling up the gaps in the face-centred lattice. The body-centred α-lattice cannot accommodate the carbon atoms without considerable distortion, which occurs when the solution in γ-iron is quickly cooled, and is the cause of the hardness of the quenched steel. A. B. Manning.

Influence of grain size on the magnetic properties of silicon iron sheet. O. von Auwers (Physikal. Z., 1925, 26, 699—700).—Investigation of the magnetic properties of a silicon-iron between 200° and 1000° gave optimum values between 700° and 1000°, depending on the atmosphere in which the specimen was heated. The recrystallisation, involving changes in grain size up to several thousand %, was independent of the atmosphere and occurred always between 900° and 1000°. These results do not accord with those of Yensen (J. Amer. Inst. Elect. Eng., May, 1924), who found a close correlation between watt-loss and grain size. A. B. Manning.

Recrystallisation of rolled silver sheet. R. Glocker, E. Kaupp, and H. Widmann (Z. Metallk., 1925, 17, 353—357).—In continuation and extension of earlier work (Glocker and Kaupp, B., 1924, 1016) the effect of annealing on the mechanical properties of silver sheet (99·7% Ag and 0·2% Cu) and on the grain growth has been studied with the help of *X*-rays. The minimum temperature at which recrystallisation takes place is a function not only of the ultimate reduction in thickness by rolling, but also of the reduction at each passage through the rolls; in any case, however, *X*-ray photographs show no signs of recrystallisation having taken place below 200°. In rolled silver sheet the [011] planes of the crystallites are oriented parallel to the direction of rolling; after annealing at 200—700° the [113] planes are oriented in this direction, whereas above 800° completely new crystals are formed which grow very rapidly and are unevenly oriented. The hardness and tensile strength of the rolled sheet remain constant up to 200°, when there is a sudden fall to about half the previous values accompanied by a rapid increase in ductility. Above 700° hardness, ductility, and tensile strength all slowly decrease. The size of the grains formed by low-temperature recrystallisation is so small that they can be distinguished only at a magnification of 1500, but the röntgenogram of the recrystallised metal shows typical signs of recrystallisation having taken place. A. R. Powell.

Electrical conductivity of certain light aluminium alloys and copper conductors as affected by atmospheric exposure. E. Wilson (J. Inst. Elect. Eng., 1925, **63**, 1108—1114).—The effect has been studied of atmospheric exposure, over a period of 24 years, on the electrical conductivity of some light aluminium alloys containing copper, nickel, manganese, and zinc in amounts not exceeding 1 or 2%. The conductivity of alloys containing copper alone or copper and manganese together diminishes continuously with time. The conductivity falls more rapidly as the copper content increases, the useful life of an alloy containing 2·61% Cu being limited to a few years. When copper and nickel are present, or copper and zinc, or combinations of all three, the conductivity at first decreases and then in some cases increases, finally reaching an approximately constant value. In two alloys containing copper and nickel there was initially a small increase in conductivity. After 7 years the conductivity of one (1·08% Cu, 1·29% Ni), dropped to about 84%, but recovered to 88·5% of its original value after 24 years. The percentage increase in electrical resistance of annealed high-conductivity copper is greater during the first year than it is for the hard-drawn variety. After exposure for 4 years the percentage increase is somewhat lower in the case of the hard-drawn wire. After a further 6 years, during which the specimens were kept loosely coiled up and not exposed, a small diminution in electrical resistance was observed. M. Cook.

Influence of the ageing temperature on the physical and chemical properties of lautal. K. L. Meissner (Z. Metallk., 1925, **17**, 369—373).—The effect of ageing lautal (aluminium with 4% Cu and 2% Si) for 16 and 24 hrs. at temperatures up to 200° has been investigated. The maximum hardness is obtained at 150° and the minimum ductility at 165°. The elastic limit and ultimate strength rise slowly up to 50°, remain constant between 50° and 100°, and finally reach a maximum at 165°, which is therefore the critical ageing temperature (*cf.* B., 1925, 321). Parallel with the increase in hardness and decrease in ductility the resistance to corrosion by sea-water diminishes with rise of ageing temperature, so that the alloy in most respects resembles duralumin, except that the changes that take place are less complicated and therefore more easily controlled. A. R. Powell.

Endurance properties of non-ferrous metals. D. J. McAdam, jun. (Trans. Amer. Inst. Min. Met. Eng., Oct., 1925. Advance copy. 22 pp.).—Stress-cycle curves for nickel, nickel–copper alloys, and other non-ferrous metals, are similar in form to the rotating-cantilever graphs obtained for steels in previous work (*cf.* J., 1922, 60 A), and it is maintained that non-ferrous metals have endurance limits as definite as those of ferrous metals. M. Cook.

Solubility of the metals of cooking utensils, and the determination of dissolved metals. K. K. Järvinen (Z. Unters. Nahr. Genussm., 1925, **50**, 221—225).—The effects of 1% hydrochloric acid, 5% sodium chloride, and 30% sugar solutions on various metals was investigated. The metal dissolved was determined by colorimetric methods, of which details are given. Pure iron was found to be more soluble than cast iron. Sugar solutions in general dissolved more metals than salt or dilute acid solutions. Iron, aluminium, zinc, nickel, and tin were more readily dissolved when pure than when alloyed. Alloys of copper, nickel, and zinc were among the most soluble and the low solubility of iron–chromium alloys was notable. A. G. Pollard.

Leaching copper matte and speiss with nitric acid. Sixt (Chem.-Ztg., 1925, 49, 943).—When finely divided leady copper matte is treated with a slight excess of nitric acid over that required to dissolve the metals a vigorous reaction takes place and the whole of the copper dissolves leaving a residue of lead sulphate, antimonic and stannic acids, and sulphur. The solution, which contains a small amount of lead, is adjusted to an acidity of 50 g. of free nitric acid per litre and electrolysed with a magnetite anode to remove the bulk of the copper. The partially exhausted electrolyte is used for dissolving further quantities of matte after adding fresh nitric acid. If a speiss containing lead, copper, arsenic, antimony, and tin is similarly treated the solution will contain the copper and lead with most of the arsenic as arsenic acid. The lead may be removed with sulphuric acid with or without a preliminary crystallisation of lead nitrate and the copper subsequently precipitated electrolytically. Arsenic acid is removed as it accumulates in the electrolyte by the addition of lime. A. R. Powell.

Electrolytic method for the determination of zinc in zinc ores. R. E. Sullivan and H. S. Lukens (Chem. News, 1925, **131**, 321—325).—The ore is dissolved in dilute nitric acid and the solution is treated with an excess of potassium hydroxide. The precipitate is collected in a Gooch crucible, washed with hot water, dissolved in hydrochloric acid, and re-precipitated with ammonia. The combined filtrates are diluted to 350 c.c. and treated with a further quantity of potassium hydroxide to make 20 g. in all. The solution is heated to 60° and electrolysed with 8 amp. at 5—6 volts, using a platinum anode and a revolving nickel crucible having an immersed area of about 30 sq. cm. as cathode. Complete deposition is effected in about 45 min. Without stopping the current the spent electrolyte is siphoned off while a stream of distilled water is allowed to flow into the vessel to maintain the level of the liquid constant. When current ceases to flow the cathode is removed, washed first in alcohol, then in ether, dried, and weighed. A. R. Powell.

Behaviour of lead anodes in the electrolysis of zinc sulphate solutions. H. Hock and F. Klawitter (Metall u. Erz, 1925, 22, 377; from Chem. Zentr., 1925, II., 1784).—Corrosion of lead anodes used in the electrolysis of zinc sulphate solutions is caused by peeling off of the lead peroxide, and by the presence of chlorides. The lead consumption can be reduced to about 0·5% of the weight of zinc obtained, by using solutions free from chlorides, by constructing the anode of pure material, and by protecting the apparatus from knocks and the solution from unnecessary agitation. The anode is subjected to a preliminary electrolytic treatment for several days in a dilute sulphuric acid bath, using a current density of 20—50 amp. per sq. m. L. A. Coles.

Electrolysis of lead and tin ores. R. Saxon (Chem. News, 1925, 131, 324—325).—Electrolysis of galena in various salt solutions or in hydrochloric or nitric acid gives only a poor deposit of lead or none at all, whereas cerussite and cotunnite yield fairly good deposits of the metal when electrolysed in solutions of alkali nitrates or in dilute nitric acid. Tin may be obtained by electrolytic reduction of cassiterite in solutions of alkali sulphates or chlorides. A. R. Powell.

Steel bomb calorimeters. Kohen.—See II.

Corrosion of copper by kerosene. Staudt.—See II.

Control of electric furnaces. Schlumberger.—See XI.

Patents.

Steel alloy for the rollers of Pilger rolling mills. M. Peters (U.S.P. 1,558,918, 27.10.25. Appl., 19.3.25).—The steel contains about 2% Cr, 1·5% W, and 1·5% Ni. M. Cook.

Heat-resisting alloy steel. G. R. Rich (U.S.P. 1,560,099, 3.11.25. Appl., 27.4.25).—An alloy steel having high resistance to oxidation when hot contains 7—8% Cr, 1·25-2·25% Ni, 0·45—0·65% Mn, 0·5—1·0% Si, 0·35—0·45% C, and S and P together under 0·03%. T. H. Burnham.

Resistant-surface alloy of iron. G. H. Charls, Assr. to United Alloy Steel Corp. (U.S.P. 1,560,207, 3.11.25. Appl., 14.4.24).—The alloy contains 0·50—6·0% Si, 3·0—30·0% Cr, and not more than 0·35% Mo. M. Cook.

Treatment of ores, concentrates, and metallurgical products. H. T. Durant and P. W. Rhodes (E.P. 240,888, 8.5.24). — Metalliferous materials containing sulphides are oxidised by treatment in a mechanical agitator with a solution containing chromic acid. The solution obtained is purified if necessary and subjected to electrolysis, *e.g.*, in a diaphragm cell, to recover the metals and effect regeneration of the chromic acid for use again. T. H. Burnham.

Recovering cyanogen from solutions. L. D. Mills and T. B. Crowe (E.P. 241,669, 3.9.24).—Spent leach liquor containing cyanide is agitated in a closed vessel through which air charged with sulphur dioxide is passed. When the liquor becomes acid it is pumped into the top of a closed vessel on to a distributing plate and thence falls through a series of perforated baffle-plates in a finely divided shower while a rapid current of air is passed upwards through the vessel to remove the hydrogen cyanide from the solution. The air containing the hydrogen cyanide is passed upwards through a similar vessel through which a shower of an alkaline liquor is constantly falling, whereby the hydrogen cyanide is absorbed, with the regeneration of alkali cyanide for further leaching operations. If the original liquor contains copper, hydrochloric or sulphuric acid must be used to liberate the hydrogen cyanide and the acid liquor may be treated for the recovery of copper by known methods. A. R. Powell.

Producing and working metallic compositions containing large proportions of nickel. Western Electric Co., Ltd. From Western Electric Co., Inc. (E.P. 241,756, 24.12.24).—Nickel-iron alloys are made by melting the components, preferably in an electric induction furnace, allowing the alloy to solidify, just melting it again, and immediately casting it. The product thus obtained is readily workable without annealing. A. R. Powell.

Smelting furnace and method of smelting ores therein. (a, b) G. W. Prince and A. Douglas, Assrs. to United Verde Extension Mining Co., (c, d) J. A. Church, jun., Assr. to United Verde Extension Mining Co. (U.S.P. 1,559,508–11, 27.10.25. Appl., 9.6.25).—(a) The ore is continuously fed into the furnace chamber of a reverberatory furnace so that a continuous longitudinal mound is formed and maintained with its apex spaced from the chamber side walls. (b) The feed of the ore is regulated so that a number of continuous longitudinal mounds are formed with the apices spaced from each other and from the side walls. (c) The ore is fed in such a manner that gradually widening valleys are produced for the free flow of molten material from the firing end towards the flue end of the furnace. (d) The furnace has unfettled side walls and the ore is fed into the chamber to form two continuous longitudinal mounds of gradually decreasing height from the firing end towards the flue end of the furnace and with the apices spaced from each other and from the side walls. The portions of the side walls exposed to the molten material are made of a noncorrosive substance. M. Cook.

Treatment of metallurgical slag. H. H. Stout (U.S.P. 1,559,803, 3.11.25. Appl., 25.11.21).—A charge of molten metallurgical slag is brought into contact with an excess of non-molten material which precipitates the metal values in the slag. The materials are mixed thoroughly but the temperature is not raised during the reaction period. The excess of the added material remains in the solid state. C. A. King.

Concentration of ores. C. P. Lewis, Assr. to Minerals Separation North American Corp. (U.S.P. 1,560,170, 3.11.25. Appl., 31.3.24).—An acid pulp of the ore is agitated with a mineral frothing agent and a sulphur derivative of carbonic acid yielding anions and cations in solution, whereby a froth containing a large proportion of a mineral in the ore is produced and is then separated. T. H. Burnham.

Electrostatic separation of mineral mixtures [ores]. W. Herz (G.P. 406,669, 4.12.23).—The ore is ground sufficiently fine to liberate the various constituents and made into a pulp with water containing an electrolyte in solution. The pulp is passed over a series of conducting or semi-conducting surfaces covered with a poorly conducting skin such as that produced on the surface of a metal by oxidation. The skin may be produced during the course of the separating operation by electrostatic valve action or by the use of the Johnsen–Rabeck effect; in the latter case the semi-conducting surface is covered with a layer of fat to insulate the surface from the electrolyte. The electrolyte and conductor are connected through resistances to opposite poles of the same source of current. A. R. Powell.

Purification of [metallurgical] gases. H. A. Brassert, Assr. to C. W. Andrews (U.S.P. 1,560,202, 3.11.25. Appl., 30.11.23).—Metallurgical gases are purified by passing them through materials heated to a temperature exceeding the fusion temperature of the impurities, which are thus sintered. M. Cook.

Purification of zirconium ores. Soc. d'Etude des Agglomérés (F.P. 590,732, 13.2.24).—The mineral is pulverised at 300° and then heated with sulphuric acid (*d* 1·84) at 70° to convert the iron into anhydrous ferrous sulphate, which is insoluble in the strong acid. A. R. Powell.

Concentration of ores by froth-flotation. Minerals Separation, Ltd., Assees. of C. H. Keller and C. P. Lewis (E.P. 223,860, 6.5.24. Conv., 23.10.23).—See U.S.P. 1,554,216 and 1,560,170; B., 1925, 926 and preceding. The substance added in addition to the mineral-frothing agent is an alkali xanthate.

Electrolytic manufacture of iron. "Le Fer" Soc. Anon. (E.P. 231,179, 18.3.25. Conv., 24.3.24).—See U.S.P. 1,556,408; B., 1925, 962.

Apparatus for refining metals. H. Harris (Reissue 16,213, 17.11.25, of U.S.P. 1,465,128, 14.8.23, Appl., 12.2.25).—See E.P. 184,639; J., 1922, 821 a.

Process for producing metals and alloys. S. D. Danieli and B. M. S. Kalling, Assrs. to Aktiebolaget Ferrolegeringar (U.S.P. 1,543,321, 23.6.25. Appl., 17.12.23).—See E.P. 209,742; B., 1924, 752.

Method of making alloys. R. Walter (U.S.P. 1,560,885, 10.11.25. Appl., 29.6.20).—See E.P. 142,847; J., 1921, 738 a.

Metallic composition [alloy]. E. F. Kingsbury, Assr. to Western Electric Co., Inc. (U.S.P. 1,561,247, 10.11.25. Appl., 7.9.23).—See E.P. 224,836; B., 1925, 76.

Metal and its manufacture. Preparing boron–iron alloys. Iron–boron alloy. A. Pacz, Assr. to Gen. Electric Co. (U.S.P. 1,562,041–3, 17.11.25, Appl., [a] 26.9.18, [b] 3.5.19, [c] 7.3.22. [b, c] Renewed 7.4.25).—See E.P. 144,185; J., 1920, 548 a.

XI.—ELECTROTECHNICS.

Rapid physico-chemical methods for the control of electric furnaces. I. E. Schlumberger (Chem.-Ztg., 1925, 49, 913—915).—Owing to the rapidity with which a charge is completed in an electric furnace there is insufficient time in which to test the product by chemical analysis before discharging. If, however, the same raw materials are always used in the process a determination of the sp. gr. of the product will usually yield results from which its composition may be calculated or read from a graph with an accuracy of about 0·5%. An apparatus for the rapid determination of the sp. gr. of a powdered solid consists of a burette of 3 mm. bore graduated in 0·01 c.c. divisions and provided with a funnel and stopper at the upper end for filling. The burette is half filled with benzene and supported in an Erlenmeyer flask filled with water to maintain a constant temperature and to magnify the scale divisions. A weighed quantity of the substance, powdered to 1 mm. or finer, is dropped into the burette and the rise in the height of liquid noted, the results being plotted on a graph against varying percentage compositions of the substance. The utility of the method is illustrated with reference to ferrosilicon, ferroaluminium, and calcium carbide; ferrotungsten, however, gives unreliable results as the carbon content cannot be controlled sufficiently to obtain concordant results. A. R. Powell.

Electrolytic determination of zinc in ores. Sullivan and Lukens.—See X.

Patents.

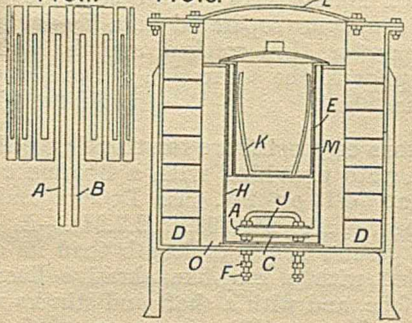
Manufacture of highly refractory bodies [filaments, *e.g.*, tungsten etc. for electric incandescence lamps etc.]. N. V. Philips' Gloeilampenfabrieken (E.P. 220,301, 31.7.24. Conv., 9.8.23).—Hafnium oxide or other compound of hafnium is mixed with the refractory metal, *e.g.*, tungsten, and the mixture compressed to a coherent rod, which is heated in a reducing atmosphere at about 1200° and then further heated electrically at a white heat in hydrogen or other reducing atmosphere. By hammering and drawing, the rod is reduced to the desired thickness. The percentage of hafnium oxide in the finished product must lie between 0·1% and 3%. (*Cf.* Van Liempt, B., 1925, 162.) J. S. G. Thomas.

Manufacture of coated metallic conductors [thermionic cathodes]. Gen. Electric Co., and C. J. Smithells (E.P. 241,984, 28.7.24).—The conductor is coated by immersion or otherwise in a liquid consisting of a colloidal suspension of the coating material, *e.g.*, calcium oxide, reduced to a sufficiently fine state of division by treatment in a colloid mill. The coating is dried and the process repeated until a sufficiently thick, white, smooth, firmly adherent coating is produced. J. S. G. Thomas.

Electrolytic cell. I. H. Levin, Assr. to Gas Industries Co. (U.S.P. 1,560,250, 3.11.25. Appl., 4.10.21. Renewed 12.5.25).—A partitioning electrode divides a tank, containing electrolyte, closed above, and itself forming an electrode, into two communicating electrolyte compartments. The tank and electrode are of the same polarity and carry independent terminal bars. Inner electrodes of opposite polarity to the tank and partitioning electrode are arranged on opposite sides of the latter and between this electrode and the tank wall. Means are provided for preventing mixing of evolved gases at the top of the cell, and diaphragms extend from the top of the cell about each of the inner electrodes. J. S. G. Thomas.

High-temperature resistance furnace. W. E. Prytherch (E.P. 241,256, 3.4.25).*—The heating element of a high-temperature resistance furnace consists of a cylindrical carbon or graphite crucible slotted in zig-zag fashion, as shown in Fig. 1. Connexion to the mains is made by metal U-tubes bolted to the horizontal portions of the projections, *A*, *B*, which previously formed part of the bottom of the crucible. The U-tubes pass through holes in the parts, *A*, *B*, and metal plates, *J*, *C*, on either side, and are connected to the mains by means of nuts, *F*. Water is circulated through the U-tubes. The heating element is placed between inner and outer cylinders, *E*, *H*, of non-porous refractory material, and the former contains a crucible, *K*, for holding the charge. J. S. G. Thomas.

FIG. 1. FIG. 3.



Electric furnace for effecting reactions between solids or liquids and gases. I. A. Jullien (G.P. 416,493, 6.6.23. Conv., 10.6.22).—Solids or liquids and gases are intimately mixed and charged simultaneously in the correct proportions into the upper portion of an electric furnace, by means of an automatic charging device consisting of a disc rotating with adjustable velocity, situated in a chamber provided with inlets for the powdered material and for the gas. The gas is preheated by passage through heat-exchangers situated below the reaction zone, and where the reaction to be effected is endothermic, the solid material may also be preheated by the waste heat of the gases formed during the reaction. L. A. Coles.

Electrode for discharge tubes. C. J. Kayko, Assr. to Gen. Electric Co. (U.S.P. 1,552,310, 1.9.25. Appl., 24.7.23).—See E.P. 219,663; B., 1925, 795.

Manufacture of incandescence lamps. A. de Graaff and D. Lely, jun., Assrs. to Gen. Electric Co. (U.S.P. 1,560,981, 10.11.25. Appl., 17.11.20).—See E.P. 154,190; J., 1922, 245 A.

Electric conductors [copper cores covered with ferromagnetic metals applied by spraying]. O. Sattelberg (E.P. 231,534, 31.3.25. Conv., 31.3.24).

Dehydrating oils (U.S.P. 1,559,035—6).—See II.

Removing impurities from fabrics (G.P. 416,281).—See V.

Eliminating iron from solutions of leucitic rocks (U.S.P. 1,559,179).—See VII.

Electrostatic separation of minerals (G.P. 406,669).—See X.

XII.—FATS; OILS; WAXES.

Analytical data on the oils from sharks and rays. A. Rogers (J. Amer. Leather Chem. Assoc., 1925, **20**, 497—498).—The following data have been obtained for the oils prepared from the fresh livers rendered within a few hours after the fish had been caught. Sand shark: $d^{25\cdot5}$ 0·9216, $n^{15\cdot5}$ 1·4761, iodine value 130·4, saponif. value 186, unsaponifiable matter 0·83%. Tiger shark: $d^{25\cdot5}$ 0·9104, $n^{15\cdot5}$ 1·4711, iodine value 94·1, saponif. value 176, unsaponifiable matter 1·71%. Hammerhead shark: $d^{25\cdot5}$ 0·9218, $n^{15\cdot5}$ 1·4760, iodine value 129·7, saponif. value 184·7, unsaponifiable matter 0·62%. Nurs shark: $d^{25\cdot5}$ 0·9184, $n^{15\cdot5}$ 1·4716, iodine value 108·3, saponif. value 188·6, unsaponifiable matter 0·41%. Devil fish: $d^{25\cdot5}$ 0·9307, $n^{15\cdot5}$ 1·4840, iodine value 166·3, saponif. value 186·3, unsaponifiable matter 5·16%. Saw fish: $d^{25\cdot5}$ 0·9220, $n^{15\cdot5}$ 1·4768, iodine value 139·2, saponif. value 184·5, unsaponifiable matter 0·91%. D. Woodroffe.

Determination of the melting point of cacao butter. T. Sabalitschka (Z. angew. Chem., 1925, 38, 1013—1014).—The author confirms the results of several investigators according to which a sample of melted cacao butter in a capillary, even if kept in ice, requires several weeks to attain completely the solid state. Melting-point results with incompletely solidified samples are too low. Welmans' method (Pharm. Ztg., 1900, **45,** 959), in which the sample does not require to be previously melted, is coming more and more into use (*cf.* Fincke, B., 1925, 640). C. Irwin.

Usefulness of the iodine value by Margosches' method in the examination of oils. E. Stock (Farben-Ztg., 1925, **31,** 403—404).—The method of Margosches (B., 1924, 639) is strongly recommended for use in industrial practice. Results obtained for a number of oils were in close agreement with those when using Hübl's solution. It is doubtful, however, if the method is as safe for resins as Hübl's method, and apparently it is not satisfactory in the case of waxes. H. M. Langton.

Evolution of hydrogen peroxide by oils on exposure to light. G. F. A. Stutz, H. A. Nelson, and F. S. Schmutz (Ind. Eng. Chem., 1925, **17,** 1138—1141).—Seeds, oils, and resins from vegetable sources affect the sensitive photographic plate in a manner similar to the action of light, and evidence has been accumulated that this action is due to hydrogen peroxide evolved from the materials. In the case of oils the effect is greatly increased on exposure to light. Saturated fatty acids from the oils are inactive, and unsaturated fatty acids strongly active, therefore the phenomenon is associated with the drying of an oil, and probably with the entire process of oxidation of the oil film. Tests with various oils which were exposed to light at a distance of 36 cm. from a standard mercury vapour lamp showed that in general the drying oils reach a maximum and then decrease within two hours of exposure, whilst the non-drying oils show a steadier increase with no maximum, in the same period. Apparently in the case of drying oils a rapid reaction chiefly on the surface takes place with the formation of a skin relatively impervious to hydrogen peroxide. Of various metal soaps added to linseed oil, those that greatly accelerated drying showed no effect, whereas those that accelerated drying but little had a strong effect. The primary oxidation of an oil is probably a molecular autoxidation, whereby molecules of oxygen are added at the double linkings, thus forming peroxides. Further action probably results in the breaking up of these peroxides with the evolution of hydrogen peroxide as well as such products as lower acids, aldehydes, carbon dioxide, and water. A film of linseed oil continued to evolve hydrogen peroxide until it became a brittle mass. Accepting the evolution of hydrogen peroxide as a measure of the progress of the destructive oxidation, then the sources of light used in accelerated testing should have a decided maximum in the region of the spectrum 4300 to 3000A. H. M. Langton.

Fat in cacao products. Lepper and Waterman.—See XIX.

PATENTS.

Separation of oils or fats [from blubber and oil-bearing tissues of marine animals]. Chemical Engineering Co. (Manchester), Ltd., J. W. Spensley, and J. W. Battersby (E.P. 241,276, 16.7.24 and 24.2.25).—By feeding strips of blubber or oil-bearing tissue into the central aperture of the high-speed pinned disc mill described in E.P. 186,462 (J., 1922, 886 A), revolving at a peripheral speed of about 20,000 ft. per min., the separate fibres in the blubber are opened up in such manner as to destroy the oil-bearing cells formed by the relative crossing of the fibres. The oil can then be separated from the fibres by keeping or by means of sieves, after slight heating if necessary. Further oil can be obtained from the fibrous residue by pressing or by centrifugal treatment. The residual fibre may then be further treated for production of gelatin. A. de Waele.

Separation of fats from animal tissues. Chemical Engineering Co. (Manchester), Ltd., J. W. Spensley, and J. W. Battersby (E.P. 241,804, 16.7.24 and 24.2.25).—The process described in E.P. 241,276 (preceding) is applied to the extraction of fats solid at the ordinary temperature, *e.g.*, beef fat and mutton fat from kel fat, lard from pig leaf, etc. After the mechanical treatment the mass is warmed to a temperature somewhat above the melting point of the fat. H. M. Langton.

Extraction of oil from palm fruit and the like. T. Dickinson, F. J. Brimley, and Nigerian Products, Ltd. (E.P. 241,297, 21.7.24).—Palm fruit or the like is treated in a closed stationary vessel supplied with superheated steam and fitted with beaters or arms, whereby the pericarp is pulped and the nuts are rendered easy to crack and open. The mass is separated from the liquid by centrifuging, and conveyed to a hollow rotary dryer supplied with hot gases ; the nuts are separated from the dry fibre in a rotary separator, then cracked, and the broken nuts screened prior to the separation of the kernels from the broken shell. A. de Waele.

Digesters or sterilisers for treating palm fruit and like nuts provided with a fibrous covering containing oil or fat. C. Downs and R. A. Bellwood (E.P. 241,298, 22.7.24).—A digester having a greater height or length than its diameter is provided with a rasp-like abrasive liner on its inner surface, and with a shaft and stirrers similarly furnished with rasp-like faces on their exterior surfaces, the faces being preferably inclined. The digester is provided with steam inlets at a number of points. A. de Waele.

Plant for removal of free fatty acids and other impurities from oils, fats, and the like. Lever Bros., Ltd., R. Craig, and C. E. C. Shawfield (E.P. 242,316, 9.5.24).—The plant described is for treating fats, oils, and the like (for example the purified oil of E.P. 224,928 ; B., 1925, 45) by means of

fresh steam under low pressure. The liquid material is passed into a horizontal treatment vessel, long in comparison with its width, divided into compartments by means of baffles, so arranged that steam is admitted into the liquid in each compartment. It is constructed of an alloy (containing about 90% of aluminium together with copper, with or without a small proportion of other metal or metals, *e.g.*, nickel or magnesium), which is not corroded by free fatty acids even when hot. A substantially uniform low absolute pressure is maintained throughout the vessel, which is heated so that the free fatty acids are eliminated with the steam, and a constant level of liquid is maintained in it. Air is prevented from obtaining access to the treated oil until it is cool.
D. G. Hewer.

Increasing the viscosity of oils. E. H. Zollinger (E.P. 215,334, 15.4.24. Conv., 30.4.23).—Highly viscous oils, soluble in mineral oils, are obtained by partly oxidising fatty oils, *e.g.*, rapeseed oil, cottonseed oil, the glyceride of triricinoleic acid (*cf.* E.P. 112,624; J., 1919, 427 a), etc., and thereafter heating to 200° for several hours. In place of fatty oil a fatty acid may be used, which has already been thickened by any well-known process.
A. de Waele.

Purification of animal fats and oils. R. Vidal (F.P. 590,400, 18.11.24).—Animal fats and oils are rendered colourless and odourless, and freed from impurities by treatment with gaseous sulphur dioxide in the presence of water, with or without the application of heat and pressure. A. R. Powell.

Production of solid alcohol structure soaps. R. Falck (E.P. 242,444, 17.11.24).—Solid alcohol soaps of high melting points are produced by heating 35—40 pts. by weight of soap, desiccated to 5% of water, in 50—60 pts. of alcohol (about 96% by vol.), under a pressure of 1·5—10 atm. at 80—150°, *i.e.*, above the b.p. of alcohol. These soaps may be mixed with ordinary amorphous jelly soaps for medicinal and pharmacological purposes.
D. G. Hewer.

Manufacture of high-percentage durable soap. A. Welter (U.S.P. 1,560,626, 10.11.25. Appl., 8.1.23).—See E.P. 202,710; J., 1923, 1032 a.

Viscosimeters.—(E.P. 241,652).—See I.

Degreasing wool. (E.P. 241,314).—See V.

Treating soya beans. (E.P. 241,249).—See XIII.

XIII.—PAINTS; PIGMENTS; VARNISHES; RESINS.

Determination of asbestine in lithopone paint. F. G. Germuth (Ind. Eng. Chem., 1925, 17, 1150).—1 g. of the dry sample is treated with acid ammonium acetate, filtered, the filter and its contents (asbestine plus barium sulphate) are transferred to a platinum crucible and ignited; fusion mixture is then added and the crucible heated to 600—700° for 30 min. The contents of the crucible are then treated with hot water, and a slight excess of dilute hydrochloric acid (1 : 1) is added to extract the barium carbonate formed. The residual asbestine is collected in a Gooch crucible and dried at 105—110° to constant weight. D. Woodroffe.

Unsaponifiable constituents of commercial rosins, with notes on rosin oil and on the polymerisation of turpentine. E. Knecht and N. B. Maurice (J. Soc. Dyers and Col., 1925, 41, 356—361).—A high-grade pale French rosin on treatment with aqueous sodium hydroxide (twice the quantity required for neutralising the acid present) yielded 4·5% of its weight as a thick yellow oil. This consists of (1) *l*-pinene, (2) an inactive yellow oil, $C_{20}H_{32}$, b.p. 270—278° d^{20} 0·9382; (3) an oil, $C_{20}H_{32}$, b.p. 315—320°, d^{20} 0·95; both (1) and (2) are completely oxidised in acid permanganate solution and react with 8 atoms of bromine per mol. of oil; (4) an oil $C_{19}H_{30}$, b.p. 330—335° identical with colophene. Rosin Yaryan (South America) treated similarly yielded 14% of unsaponifiable material giving the same fractions and, in addition, a diterpene, $C_{20}H_{32}$, b.p. 360—370°, d^{20} 0·9572. Spanish and Portuguese rosins after the removal of abietic acid (cf. Blanes, J., 1915, 878) contained respectively 4·5% and 4% of unsaponifiable matter identical with that from French rosin. Gum Thus contains pinene and the oils (2) and (3) above, but no colophene. The temperature at which rosin distils is 320—370° and not 200° as usually stated. Rosin oil (after extraction of abietic acid with sodium hydroxide) consists of colophene and the three oils of composition $C_{20}H_{32}$ (above), and abietic acid when distilled yields the same products. Turpentine heated under pressure at 295° for 24 hrs. is changed to a thick yellowish-brown oil consisting of dipentene and the same three diterpenes obtained from rosin and rosin oil. Polymerisation of turpentine at 0° by means of 85% sulphuric acid gives a dipentene and the two diterpenes of b.p. 268—275° and 315—320°, identical with those produced by heat. It appears therefore probable that the diterpenes found in commercial rosin result from the polymerisation of turpentine under the action of heat, but from the examination of Gum Thus it is concluded that two of the diterpenes are also present in the unsaponifiable part of the resin as it comes from the tree and are produced by the cold polymerisation of turpentine. The colophene isolated from terebenthene by Deville (Annalen, 1841, 37, 193) is not identical with that from abietic acid but is really a diterpene. The resin contained in coal does not appear to be a resin acid but is related to the higher terpenes and is probably a tetraterpene.
A. Coulthard.

Linoleum and triolin. A. Simon (Chem. Umschau, 1925, 32, 272—275).—In triolin, the oxidised oil and resin cement of linoleum are replaced by a mixture of nitrocellulose and non-inflammable material such as tricresyl phosphate etc., this base being compounded while warm with the usual cork, fillers, etc. The tendency to slippage is somewhat less for triolin than for linoleum. The tensile strengths of the two products are not appreciably different. Triolin is harder than linoleum, but its elastic recovery is only 60% of that of linoleum. The resistance to wear is 20% higher for linoleum than for triolin. Linoleum is not altered by treatment with steam at 130—335°, but triolin develops wart-like excrescences, and disintegrates to a soft mass with formation of yellow tar. Linoleum is also considerably more resistant to a direct flame, and whilst the fumes from burning linoleum are apparently not toxic, those from triolin killed a mouse in about 1 min., the toxicity being due to the presence of carbon monoxide, nitric oxide, and hydrocyanic acid. Even at as low a temperature as 20°, nitric anhydride appears to be evolved when air is led over triolin. A. DE WAELE.

Evolution of hydrogen peroxide by oils on exposure to light. STUTZ, NELSON, and SCHMUTZ. —See XII.

PATENTS.

Manufacture of lithopone. W. CARPMAEL. From FARBENFABR. VORM. F. BAYER U. CO. (E.P. 241,795, 27.3.25).—Dried crude lithopone, travelling along a rotary furnace, is heated by combustion gases, practically free from dust and oxygen, passing in the opposite direction at a temperature slightly higher than that to which the lithopone is to be heated. The heated material is finally quenched in water. D. F. TWISS.

Manufacturing wax-colour binding means. J. LORENZ (E.P. 225,189, 21.10.24. Conv., 23.11.23). —A binding medium for pigments is produced by dissolving glue, gelatin, casein, or gluten in a solution of caustic soda, potash, borax, or ammonia; molten vegetable wax, paraffin, stearic acid, and a mixture of linseed oil, turpentine, and benzine are also introduced with continuous agitation. The product may be obtained as a paste or as flakes. The powdered product, if mixed with pigments, yields "oil-wax colours," which, on the addition of water, are ready for use. Dried coatings of such colours are resistant to water. D. F. TWISS.

Treatment of condensation products of carbonide [carbamide] or its derivatives and formaldehyde. F. POLLAK (E.P. 240,840, 30.9.25. Conv., 1.10.24. Not yet accepted).—Condensation products of carbamide or its derivatives with aldehydes such as formaldehyde, in either the semi-solid intermediate form or in the final hardened form, are converted into the sol state by mechanical or chemical means. For example, the products are treated in a colloid mill or similar high-speed apparatus in the presence of water or other dispersive agent; or they are submitted to the action of suitable solvents, under heat and with or without the addition of catalytic agents; as solvent, formaldehyde is especially suitable. The process is particularly useful for the conversion of powdered waste material into homogeneous masses, in which case it is not necessary that the whole should be dissolved in the sol form. The hardened condensation product when boiled with 10% hydrochloric, nitric, or sulphuric acid, yields a solution which, on cooling, deposits a bulky white precipitate, and this, after drying, can be brought into the sol state by mechanical dispersion or with the aid of a solvent such as formaldehyde. The solutions so obtained may be used for varnishes or converted into solid masses by heating. Instead of acid solutions, solutions which produce acids when heated with the condensation products may be used, *e.g.*, ammonium salts of strong acids, esters, acid chlorides, and acid salts.

Process for treating soya beans. O. JOHNSON (E.P. 241,249, 10.6.24).—Soya beans are soaked for 12 hrs. in water at a temperature not exceeding 70°, ground or crushed in a moist state, and treated with 6 pts. of water at 70° containing an alkali, *e.g.*, borax, caustic soda, or sodium bicarbonate. The milky juice is separated from the mass, *e.g.*, by centrifuging, and further centrifuged to separate the oil. The juice is then curdled with dilute acid or alum, the curd allowed to settle, and the "whey" drawn off. The curd is repeatedly washed with water at 70°, and may be bleached by repeatedly dissolving in alkali and re-precipitating with acid. It is then freed from water by centrifugal treatment, dried in a vacuum at a temperature not exceeding 60°, and ground. The product can be used in the manufacture of paints, sizes, adhesives, etc. A. DE WAELE.

Production of pure, water-white turpentine and pine oil. C. PRAETORIUS (G.P. 414,204, 23.2.22.).—The contents of the retort are cooled during dry distillation by the introduction of water or other suitable liquid through a tube with fine openings. C. T. GIMINGHAM.

Pigments (E.P. 240,852).—See IV.

Resin from pulp-mill black liquor (U.S.P. 1,560,420).—See V.

XIV.—INDIA-RUBBER; GUTTA-PERCHA.

PATENTS.

Process for impregnating materials [with rubber]. J. J. SCHILTHUIS and D. F. WILHELMI (E.P. 228,893, 2.2.25. Conv., 8.2.24).—By treating textile material, *e.g.*, cotton yarn for motor tyres, with a solution or suspension of a hydroxide or carbonate of an alkali metal, or of a hydroxide of an alkaline-earth metal, some form of soap also being added if desired, the effectiveness of subsequent impregnation by means of rubber latex, with or without sulphur, is greatly increased. Cotton so treated is rendered much more resistant to fatigue. D. F. TWISS.

Compounding rubber. C. C. LOOMIS and H. E. STUMP, Assrs. to HEVEA CORP. (U.S.P. 1,558,688, 27.10.25. Appl., 10.3.23).—Ingredients intended for rubber are prepared by encasing the particles in a thin coating of rubber before the actual mixing operation. D. F. TWISS.

Rubber compound and its process of manufacture. E. E. A. G. MEYER, Assr. to MORGAN and Wright (U.S.P. 1,558,701, 27.10.25. Appl., 13.3.25).—The milling of unvulcanised rubber is facilitated by the addition of latex. D. F. Twiss.

Rubber vulcanisation. S. B. Molony, Assr. to R. T. Vanderbilt Co. (U.S.P. 1,558,707, 27.10.25. Appl., 20.12.19).—Rubber is vulcanised with the aid of thiuram disulphide as accelerator. D. F. Twiss.

Vulcanising rubber. G. H. Stevens (U.S.P. 1,559,196–8, 27.10.25. Appl., [A] 25.6.23 [B, C] 26.1.25).—The hot-vulcanisation of rubber is expedited by the use of [A] tetratolyltricarbodi-imide or [B] tetraxylyltricarbodi-imide or [C] by introducing into the rubber substances such that tetraphenyltricarbodi-imide is formed during the vulcanisation process. D. F. Twiss.

Composition of matter [vulcanising rubber]. H. A. Winkelmann and H. L. Trumbull, Assrs. to B. F. Goodrich Co. (U.S.P. 1,559,925, 3.11.25. Appl., 20.9.23).—Rubber or similar material is mixed with a vulcanising agent and the condensation product of an aldehyde with a substituted thiocarbamide and is then vulcanised. D. F. Twiss.

Process of making rubber compositions. G. W. Acheson (U.S.P. 1,560,132, 3.11.25. Appl., 23.6.22).—A rubber composition is prepared by introducing a dried deflocculated inorganic solid into rubber solution, then effecting precipitation by the addition of an organic liquid, such as acetone, and finally separating the rubber mixture from the liquid components. D. F. Twiss.

Production of hydrogenated caoutchouc. H. Staudinger (G.P. 415,871, 16.4.22).—By treating rubber with hydrogen and a hydrogen carrier above 200° in the presence of solvents or under increased pressure if desired, a colourless amorphous hydrocaoutchouc is obtained which is soluble in ether, benzene, or chloroform, but insoluble in alcohol or acetone. D. F. Twiss.

Production of soft vulcanised rubber and vulcanite. Technische Chemikalien Co. (G.P. 416,677, 14.4.23).—The production of soft rubber or vulcanite by vulcanisation is facilitated and improved by introducing into the mixture before vulcanisation, unsaturated, hydroxylated, sulphur-containing compounds, such as are obtainable from petroleum or tars by extraction with pure or aqueous alcohol or acetone. D. F. Twiss.

Treating rubber. O. H. Smith, Assr. to Naugatuck Chemical Co. (U.S.P. 1,562,262, 17.11.25. Appl., 15.9.24).—See E.P. 239,849; B., 1925, 1000.

XV.—LEATHER; GLUE.

Fluorescence, a method of detecting synthetic tannins in vegetable tanning extracts. O. Gerngross, N. Ban, and G. Sandor (Collegium, 1925, 565—572).—Solutions of vegetable tanning extracts (1 : 1000) were examined under ultraviolet light. Only quebracho and tizerah gave any fluorescence and this was only slight. Solutions (1 : 1000) of synthetic tannins, on the other hand, showed distinct characteristic fluorescence which was quite distinct even in strengths 1 : 100,000. The faint yellowish-green fluorescence of quebracho and tizerah extract was repressed by adding small amounts of acid or alkali. The addition of natural vegetable tanning extracts to synthetic tannins tends to diminish the amount of fluorescence, but the latter is apparent with nearly all mixtures containing 10—20% of synthetic tannin. There is no connexion between the Procter–Hirst reaction and the fluorescence test. "Tannesco," "Ordoval G," and "Kárpáti's tannin," which give a negative or only faint reaction with the aniline–hydrochloric acid reagent, exhibit extraordinarily strong blue or bluish-violet fluorescence. The test is carried out as follows:—three drops of the diluted extract (approx. 28% of tannin) are dissolved in 5 c.c. of distilled water with as little heating as possible, filtered several times until clear, and two drops of the filtrate are diluted with 10 c.c. of distilled water and examined in a dark room by the light of a six-amp. Liliput lamp (220 volts). A control test with natural vegetable tanning material should always be made for purposes of comparison. D. Woodroffe.

Destructive and preservative effect of neutral salts upon hide substance. A. W. Thomas and S. B. Foster (Ind. Eng. Chem., 1925, 17, 1162—1164).—Portions of hide powder were treated with $M/10$—$4M$ solutions of different salts of alkali metals, and samples of the liquor withdrawn at intervals to determine the nitrogen content. Toluene was added to inhibit bacterial action. The order of hydrolysis for the most concentrated solutions after 100 days was $NaBr > CaCl_2 > LiCl > NaI = MgCl_2 > KCl = NaCl > H_2O > MgSO_4 = Na_2SO_4$. The hydrolysis increased as the concentration of the solutions increased. Solutions of magnesium and sodium sulphates are better hide preservatives than sodium chloride solutions. Hide powder immersed in strong solutions of sodium sulphate is not changed and the solution remains clear, whereas in concentrated halide solutions the hide powder particles appear smaller and slimy and the solution becomes turbid. D. Woodroffe.

Patents.

Removing hair from hides or skins. H. C. Ross, H. C. Marris, and W. Walker & Sons, Ltd. (E.P. 241,666, 1.9.24).—15 lb. of sulphur are mixed with 10 gals. of boiling water, 15 lb. of burnt lime are added, the mixture is boiled for 1 hr., allowed to settle, and the clear orange-coloured liquor is run off. It should have *d* 1·120. 1—10 gals. of this liquor and 5—15 gals. of commercial liquor ammonia are mixed with 1000 gals. of water in the unhairing pit. The temperature may be varied from 45° to 10° according to the result required. Skins are immersed in the liquor for 6 hrs. to 3 days until the hair is loosened. D. Woodroffe.

Material for depilating and bating hides. L. Krall, and Lengrand, Krall et Cie. (F.P.

558,132, 31.10.22).—The material contains cultures of *Aspergillus oryzæ*, with or without the addition of constituents of hides, such as elastin and keratin. For example, mixtures of rice, elastin, and keratin, are inoculated with *Aspergillus oryzæ* cultivated on rice at 36° with aeration. The product, mixed with lime, is used for depilating and bating hides, and has the property of hydrolysing only the elastic constituents, the collagens not being attacked.

L. A. COLES.

Production of tanning agents. A.-G. FÜR ANILIN-FABR., Assees. of T. MARIAM (G.P. 416,277, 27.11.20).—Aluminium or chromium salts of the products obtained by the successive or simultaneous action of bisulphites, alone or together with sulphites, and aliphatic aldehydes or substances yielding them, upon aromatic nitro-compounds, such as nitrobenzene, nitrotoluene, nitronaphthalene, and nitrophenanthrene, are used as tanning agents. The products do not split off sulphuric acid during the tanning process. For example, a mixture of nitrobenzene, 10% sodium bisulphite solution, and 30% formaldehyde, is heated to 130—150° under pressure for several hours, and the product is converted into its aluminium salt by the addition of the calculated quantity of saturated aluminium sulphate solution. After separation of sodium sulphate, the solution is used for tanning, or the aluminium salt may be precipitated by the addition of alcohol, as a golden yellow syrupy product, which on drying forms an amorphous powder readily soluble in water.

L. A. COLES.

Tanning process. H. FRIEDENTHAL (G.P. 416,508, 26.7.22).—Intimate mixtures of strong solutions of vegetable or mineral tanning agents with fatty substances or hydrocarbons not miscible with the solutions, are used as tanning agents, the compositions being rubbed into the skins. For example, oak bark extract containing about 30% of tannin is worked up at 30° to a paste with vaseline of m.p. 25°, or 30% ferric chloride-potassium chloride solution is mixed with coconut oil softened by heating. L. A. COLES.

Manufacture of colloidal substances [glue] in the form of small balls or grains. A. OBERSOHN, W. WACHTEL, and P. ASKENASY (U.S.P. 1,559,126, 27.10.25. Appl., 7.1.25).—A hot concentrated solution of glue is sprayed under pressure to form drops, which are passed into and through a gaseous cooling agent to which pressure is applied to retard the rate of passage of the drops through it. D. WOODROFFE.

Dyeing leather (G.P. 417,209).—See VI.

XVI.—AGRICULTURE.

Two unusual colloidal soils. C. F. SHAW (Soil Sci., 1925, **20**, 419—423).—A soil material from the dried bed of a lake in California contained from 134 to 540% of water in the field condition without drainage. The moisture equivalent was from 348 to 380, and the loss on ignition 38 to 54%. The soil had a horny texture when dry and consisted of unweathered material, the inorganic matter being mainly silica. A subsoil from the island of Hawaii, of an elastic and cheese-like consistency, and formed by weathering of lavas under high rainfall and temperature, contained about 375% of water.

C. T. GIMINGHAM.

Critical p_H for the formation of hardpan in acid clay soils. J. R. SKEEN (Soil Sci., 1925, **20**, 307—311).—The p_H value in the neighbourhood of natural hardpans occurring in an acid, heavy clay soil ranged only from 4·7 to 4·95. The hardpan was cemented by iron and aluminium compounds for the most part, and experiments with artificial soils showed that ferric hydroxide may be precipitated on kaolin, giving a hardpan analogous to that found in the field at p_H values lying between 4·4 and 5·0. It is concluded that there is a critical p_H for hardpan formation in an acid clay soil. C. T. GIMINGHAM.

Determination and control of the potassium and phosphorus content of the soil in practice. E. MÖLLER-ARNOLD (Z. Pflanz. Düng., 1925, B4, 503—511).—The various methods which have been suggested for determination of the manurial requirement of soils as regards potassium and phosphoric acid are considered from the point of view of their direct economic value to the practical agriculturist. The methods discussed include both laboratory tests and field trials. C. T. GIMINGHAM.

Alkali [soil] studies. III. Tolerance of barley for alkali [salts] in Idaho soil. R. E. NEIDIG and H. P. MAGNUSON (Soil Sci., 1925, **20**, 367—391; *cf.* B., 1925, 182, 292).—The results of pot experiments are discussed in which 4 successive crops of barley were grown in soil treated with varied amounts of sodium chloride, carbonate, and sulphate singly and in combination. In general, with all treatments, the salts were most toxic to the first crop, stimulated the second crop, and were somewhat toxic to the third crop. With the fourth crop, the yields tended to approach the normal. Mixtures of all three salts, in most cases, increased the yields of all crops except the first. Different soils behave very differently towards added alkali salts, and the tolerance of crops for these salts varies widely in different soils.

C. T. GIMINGHAM.

Disintegration of limestone and dolomite separates as influenced by zone of incorporation. W. H. MACINTIRE and W. M. SHAW (Soil Sci., 1925, **20**, 403—417).—Limestone and dolomite, ground to varying degrees of fineness, were incorporated with soil in lysimeters under field conditions. After 4 years, the extent of decomposition was measured by determination of the residual carbonate. The soil used had never been limed and had a p_H value of 6·23. With both limestone and dolomite, the most finely-ground material (" 80—200-mesh ") was practically completely decomposed, whether mixed with the surface soil or lower layer of soil. The coarsest material ("10—20-mesh ") showed little change;

other grades were intermediate. Limestone, in each case, showed greater decomposition than the corresponding grade of dolomite. Both materials, of each degree of fineness, were more completely decomposed in the lower soil layer than in the surface layer.

C. T. Gimingham.

Nitrate accumulation under a straw mulch. W. A. Albrecht and R. E. Uhland (Soil Sci., 1925, 20, 253—267).—Experiments in pots and in the field on the causes of the reduced accumulation of nitrates under a heavy straw mulch (*cf.* Albrecht, J., 1923, 153 A) indicate that, by cutting down evaporation and aeration and thus increasing the moisture content and lowering the temperature, the mulch induces a physical condition of the soil unsuitable for nitrification. Ammonia is present in larger quantities under a mulch than in soil not mulched.

C. T. Gimingham.

Residual effects of 40 years' continuous manurial treatments. II. Effect of quicklime on soil treated with dung. J. W. White and F. J. Holben (Soil Sci., 1925, 20, 313—327; *cf.* B., 1924, 990).—A study of the condition and amount of soil organic matter on two series of field plots after 40 years of continuous treatment and cropping; one series having been manured with dung every two years at the rate of six tons per acre and with quicklime every four years at two tons per acre, and the other with dung only. Determinations were made of total nitrogen, organic carbon, and of organic matter and nitrogen soluble in 3% alkali. In general, the results indicate that the soil receiving both dung and lime has utilised the organic matter more completely, has produced a higher yield of dry matter, and, at the end of the period, contains more organic matter and nitrogen than the soil receiving dung only. From a consideration of the relation found to exist between the residual organic matter and the total yields of dry matter on similarly treated plots throughout the series, it is estimated that 93% of the organic matter on the lime and dung plots and 88% on the plots treated with dung alone is derived from crop residues. C. T. Gimingham.

Action of copper compounds on "stinking smut" of wheat. Bodnar and Terenyi.—See XIX.

Clays as emulsifiers for mineral oils. Yothers and Winston.—See XXIII.

Spreaders for spray materials. Robinson.—See XXIII.

Mercuriferous germicides for pickling grain. Krauss.—See XXIII.

XVII.—SUGARS; STARCHES; GUMS.

Patent.

Extracting sugar from beets. I. de Vecchis, Assr. to Home and Colonial Investments, Ltd. (U.S.P. 1,562,151, 17.11.25. Appl., 5.12.23).—See E.P. 211,113; B., 1924, 991.

XVIII.—FERMENTATION INDUSTRIES.

Determination of diastase in malt extract. Seeligmann (Chem.-Ztg., 1925, 49, 943).—The malt extract is mixed with water to give a 4% solution, which is filtered, and 10 c.c. of the filtrate are digested at 40° for exactly half-an-hour with 250 c.c. of a 3% solution of arrowroot starch; 3 c.c. of 10% sodium hydroxide solution are added, and the mixture is cooled rapidly and diluted to 300 c.c. The solution is transferred to a burette and used for the titration of 25 c.c. of a dilute Fehling's solution standardised as usual with pure maltose. The maltose content of the original extract is determined by titration against the same Fehling's solution, and the increase in maltose in mg. per g. of extract after treatment with the starch gives the diastatic power of the malt in Pollak units. A. R. Powell.

Volutin in yeast cells. M. Glaubitz (Z. Spiritusind., 1925, 48, 363).—Volutin, a nucleic acid compound, is stained blue when yeast, killed in 40% formalin, is treated first with methylene-blue (0·4% in 25% alcohol) and then with 1% sulphuric acid. It appears as globules or flakes, and may occupy up to 90% of the cell volume. The volutin content of yeast, produced by the aeration process, increased during the first 4 hrs. and then decreased to one-third by the eighth hour. In a series of 30 experiments no connexion could be detected between volutin content and fermenting power of the yeast, nor between volutin and the nitrogen content. Pressed yeast, kept at room temperature, suffered no diminution of volutin in 6 days, but after 12 days the cells were free from volutin. G. T. Peard.

Direct and indirect methods for the determination of dry matter, and the determination of sugar in vinegar. G. Reif (Z. Unters. Nahr. Genussm., 1925, 50, 181—192).—Comparative experiments show that direct and indirect methods do not give similar figures for determinations of dry matter in synthetic vinegars. For this determination in fermentation vinegars the indirect method of Lehmann and Gerum (Z. Unters. Nahr. Genussm., 1912, 23, 267; *cf.* Fresenius and Grünhut, J., 1920, 555 A) is advocated. For the determination of sugar in vinegars the iodometric method, coupled with the use of the sugar tables of Auerbach and Bodländer (cf. J., 1922, 991 A), is shown to be very satisfactory.

A. G. Pollard.

Determination of tannic acid in fermentation vinegar. G. Reif (Z. Unters. Nahr. Genussm., 1925, 50, 192—195).—The method described is as follows:—A reagent is prepared by dissolving 3 g. of sodium tungstate, 2 g. of sodium phosphate, and 0·05 g. of molybdic acid in 25 g. of warm water, heating the solution on a water bath, and adding concentrated nitric acid, drop by drop, until the solution is neutral to litmus. 10 c.c. of the vinegar are treated with 0·5 c.c. of 10% hydrochloric acid and 1 c.c. of the reagent, heated quickly to boiling and maintained at that temperature for 2 hrs. The violet coloration produced is compared with that of a standard solution. Tannic acid can be determined by this method in dilutions of 1 : 500,000. Tannic acid is absent from synthetic vinegars, and with mixtures of synthetic vinegar and fermentation vinegar the coloration produced is proportional to the amount of the latter present. A. G. POLLARD.

PATENT.

Production of hop extracts. ELEKTRO-OSMOSE A.-G. (GRAF SCHWERIN GES.), Assees. of P. KOLBACH, W. WINDISCH, and W. DIETRICH (G.P. 413,913, 10.12.22).—Free acids present in hops, hop extracts, waste material from hops, and by-products from brewing processes, are neutralised by boiling with alkaline solutions in which the maximum concentration of hydroxyl ions is 0·005 g.-mol. per litre. The extracts, which are concentrated in the usual manner, contain the bitter constituents in a soluble form. L. A. COLES.

XIX.—FOODS.

Action of copper compounds on "stinking smut" of wheat. J. BODNÁR and A. TERÉNYI (Chem.-Ztg., 1925, 49, 902).—When treated with salts of copper, spores of "smut" absorb copper, the amount taken up depending on the compound used. Inhibition of germination of the spores occurs if they absorb 0·4% or more of their weight of copper. It is, therefore, important that copper compounds used in the dry state for combating this fungus, should be sufficiently soluble in the soil water to keep the concentration of copper above that necessary to prevent germination. C. T. GIMINGHAM.

Rational milling of maize. D. MAROTTA and F. DI STEFANO (Annali Chim. Appl., 1925, 15, 227—238).—Roll mills give much better results than the ordinary stones when applied to maize, since they allow of the removal of the germ and of the better separation of the bran constituents. T. H. POPE.

Determination of sucrose in condensed milk. K. SCHERINGA (Pharm. Weekblad, 1925, 62, 1034—1035).—In a 200 mm. tube at 20° the rotations of an inverted 10% solution of anhydrous lactose and an inverted 10% sucrose solution are respectively $+11·1°$ and $-4·0°$. In view of the fact that the cupric-reducing power of dextrose is very nearly equal to that of inverted anhydrous lactose, the proportion of sucrose in condensed milk may be determined as follows: 33·33 g. of the milk are dissolved to 100 c.c. in the usual way and the bright, filtered solution is inverted. If this inverted solution has the rotation $b°$ and a reducing power corresponding with $a\%$ of dextrose, the percentage of sucrose in the total sugars is given very nearly by $(11—10b/a)/0·151$. A slightly more accurate result is obtained by substituting $0·993a$ for a. T. H. POPE.

Chemistry of the ripening of cheese. II. W. GRIMMER and B. WAGENFÜHR (Milchw. Forsch., 1925, 2, 193—198; Chem. Zentr., 1925, 96, II., 1718).—The percentages of nitrogen and sulphur in "caseoglutin," obtained from several different kinds of cheese, differ from those given by earlier workers. "Caseoglutin" is considered to be a group of substances, differing in elementary composition, but having the same origin in cheese. Details as to its solubility and specific rotation in various solvents are given. Three times as much tryptophane can be obtained from it as from casein, but it does not contain three times as much sulphur; it is regarded as a mixture of the sulphur-free and sulphur-containing components of casein. C. T. GIMINGHAM.

Determination of fat in cacao products. H. A. LEPPER and H. C. WATERMAN (J. Assoc. Off. Agric. Chem., 1925, 8, 705—710).—The prepared sample (2—3 g.) is weighed into a Knorr extraction tube containing a tightly packed mat of purified asbestos (washed with alcohol, ether, and petroleum benzine) and the tube inserted into the rubber stopper of a filtering bell-jar which is connected to suction through a two-way stopcock. A 150-c.c. flask of known weight is so placed that the stem of the tube passes through its neck. The tube is filled two-thirds full of petroleum benzine (re-distilled below 60°), the sample stirred with a flat-ended glass rod, left to stand for 1 min., and the tube drained by suction. More solvent is added while the tube is rotated and the sides are washed down. About 10 extractions are necessary for complete removal of the fat. The tube is then disconnected, traces of fat are washed from the stem, the solvent is evaporated, and the contents of the flask are dried to constant weight. The difference between the figures given by this method and the higher ones by that of the Assoc. of Off. Agric. Chemists, which uses anhydrous ether as solvent, is shown not to be due to fat but chiefly to theobromine. The fat extracted by petroleum benzine is free from sugar and cacao alkaloids. D. G. HEWER.

Solubility of metals of cooking utensils. JÄRVINEN.—See X.

PATENTS.

Desiccation, particularly of substances of organic origin. H. L. P. TIVAL and F. A. DESCOMBES (E.P. 222,154, 22.9.24. Conv., 22.9.23). —The solution or substance to be desiccated is frozen, ground, the ground particles are introduced as a mist into an air-tight receptacle of high vacuum and low temperature, and precipitated by mechanical and/or electrical means on an endless transporting surface. Escaping vapours are precipitated or condensed, and the material during its passage through the apparatus may be more or less completely sterilised by exposure to bactericidal rays, such as X-rays, Goldstein canal rays, or those from ultra-violet ray tubes. Rotating brushes are used for stirring and projection of the mist or powder to the transporting surfaces. D. G. HEWER.

Processes of making butter. A. E. WHITE. From MILK OIL CORP. (E.P. 242,363, 12.8.24).—Butter is made without churning from pure milk oil by adding an emulsifying agent obtained from milk, such as casein or dried skimmed milk, together with water, so that the fat percentage of the mixture is between 50 and 80. The mixture is heated above the melting point of milk oil and stirred and mixed until the size of the fat globules is diminished to approximately that found in natural milk or cream (5μ). An emulsion may be produced by means of a mechanical emulsor, or the mixture cooled to 27° and stirred until the viscosity is increased to a point where the internal friction causes emulsification. The emulsion is cooled to 18° or lower, and practically complete sudden agglomeration brought about, with expulsion of some buttermilk, by simple pressure with a wooden paddle etc., instead of by violent agitation resulting in churning as described in U.S.P. 1,509,086/8 (B., 1924, 1027). The resulting butter may be worked and treated as usual. D. G. Hewer.

Treating flour. F. L. Dunlap, Assr. to Industrial Appliance Co. (U.S.P. 1,560,045, 3.11.25. Appl., 25.7.23).—A shortening effect is produced by increasing the acidity of the flour beyond the optimum for bread making. D. G. Hewer.

Prevention of decay of citrous fruits. H. R. Fulton and J. J. Bowman (U.S.P. 1,560,558, 10.11.25. Appl., 11.9.25).—The fruits are treated with an aqueous solution of lithium carbonate at a temperature below 49°. D. G. Hewer.

Preservation of fresh fruits and vegetables. H. R. Fulton and J. J. Bowman (U.S.P. 1,560,559, 10.11.25. Appl., 14.9.25).—An aqueous solution which contains the sodium oxide and boric acid radicals in the proportion of 1 to 3, and of such strength that it will retard the development of stem end rot, blue mould rot, etc. (*e.g.*, 5 pts. by weight of borax and 0·43 of sulphuric acid in 100 of water) is applied to the surface of the fresh fruit or vegetable. D. G. Hewer.

Direct cooling [refrigeration] of goods [foods]. A. J. A. Otteson (U.S.P. 1,562,360, 17.11.25. Appl., 1.3.24).—See E.P. 211,032; B., 1924, 310.

XX.—ORGANIC PRODUCTS; MEDICINAL SUBSTANCES; ESSENTIAL OILS.

Determination of morphine in opium. E. Machiguchi and S. Shirono (J. Pharm. Soc. Japan, 1925, [524], 849—861).—8 g. of opium powdered and dried at 60° are shaken with 2 g. of calcium hydroxide and 80 c.c. of water for 1 hr. and filtered through a paper of 15 cm. diam. 50 c.c. of the filtrate are poured into a thick-walled bottle of 100 c.c. capacity containing 20 c.c. of a mixture of ether and benzene (4 : 1) and 1 g. of ammonium chloride, and shaken gently for 10 min. After keeping for 20 hrs. the separated crystals are collected on a filter paper of 9 cm. diam., washed four times with 5 c.c. of water, and dried below 60°. After cooling, and washing with 20 c.c. of ether–benzene (1 : 1) the alkaloid is dried first at a low temperature then at 96—100°. It is dissolved in 10*N*-hydrochloric acid and titrated with 10*N*-alkali using 3 drops of methyl red as indicator. The amount of the acid used multiplied by 0·5704 gives the percentage of morphine. The result obtained lies between those given by the official British and American methods. K. Kashima.

Bio-assay of thyroid. R. Hunt (U.S. Pub. Health Rep., 1925, **40**, 1461—1466).—The therapeutic value of thyroid cannot be ascertained by determination of the iodine content, as analysis does not differentiate between added iodine and iodine in thyroid combination. The acetonitrile method (the increased resistance to acetonitrile of white mice to which thyroid has been administered) is recommended for assay purposes. R. E. Thompson.

Examination of neoarsphenamine [neosalvarsan] and sulpharsphenamine. E. Elvove (U.S. Pub. Health Rep., 1925, **40**, 1235—1248; *cf.* B., 1924, 767).—Nearly all the oxidisable sulphur of neosalvarsan is oxidised by iodine in alkaline solution, whilst less than half of the total sulphur in sulpharsphenamine is oxidised by this procedure. This appears to be due to differentiation by iodine between organically combined sulphur and that present as uncombined sodium formaldehyde bisulphite, and not to a slow rate of oxidation of the organically combined sulphur. Advantage is taken of this difference in behaviour for the purpose of differentiating between neosalvarsan and sulpharsphenamine, and, in conjunction with other determinations, for evaluating, at least approximately, the composition of mixtures of them. R. E. Thompson.

Gas washing. Absorption with mixed absorbents. Weissenberger, Schuster, and Zack.—See I.

Ethyleneglycol as anti-freeze material. Curme, jun., and Young.—See I.

Patents.

Manufacture of hydrocyclic ω-aminoalkyl compounds. H. Rupe (E.P. 240,814, 14.9.25. Conv., 1.10.24. Not yet accepted).—Hydrocyclic ω-aminoalkyl compounds are prepared by catalytically reducing hydrocyclic cyano-compounds, and if necessary hydrolysing the intermediate products. The process is particularly suitable for the treatment of α-cyano derivatives of hydroaromatic ketones, such as camphor, menthone, thujone, pulegone, and *cyclo*hexanone. The products are basic in character and can be converted into water-soluble salts which possess therapeutic properties. For example, a solution of α-cyanocamphor is treated with hydrogen in the presence of a nickel catalyst. After the calculated quantity of hydrogen has been absorbed (3 H_2 per 2 mols. of cyanocamphor), the product is filtered, the solvent distilled away, and the hydrochloride of methylenecamphor-camphomethylamine precipitated. The latter is then hydrolysed, the oxymethylenecamphor formed as by-product removed with ether, and the aqueous solution evaporated to obtain the hydrochloride of α-camphomethylamine.

Production of urea [carbamide]. L. Casale (E.P. 241,123, 19.5.25. Conv., 23.12.24).—In the continuous production of carbamide from ammonia and carbon dioxide, economy of heat and power is obtained by utilising the gaseous mixture obtained from a catalytic synthetic ammonia plant, while still under the influence of pressure and heat.

C. O. Harvey.

Making *iso*bornyl esters. J. Ebert, Assr. to J. C. Dehls and L. Stein (U.S.P. 1,555,947, 6.10.25. Appl., 13.5.20. Renewed 19.2.25).—40·8 pts. of pinene saturated with hydrogen chloride are heated under reflux for 20 hrs. with 130 pts. of glacial acetic acid to which 20 pts. of finely-divided tin or zinc and 2 pts. of finely-divided copper or iron have been added. The excess of acetic acid is distilled off under reduced pressure and the residue poured into water, whereupon *iso*bornyl acetate separates in 90% yield.

T. S. Wheeler.

Purification of butyric aldehyde. C. Bogin, Assr. to Commercial Solvents Corp. (U.S.P. 1,556,067, 6.10.25. Appl., 12.5.24).—6% of water is added to butaldehyde and the constant-boiling mixture obtained is distilled at 68°, no polymerisation occurring. On cooling, 98% of the water separates, and the remainder is removed by salting out.

T. S. Wheeler.

Sterilising proteins or other colloidal material. C. A. Mills (U.S.P. 1,556,120, 6.10.25. Appl., 25.7.22).—A serum protein or other sensitive protein, such as globulin, is dissolved in a dilute solution of sodium chloride and treated with mercuric chloride. A precipitate is produced, and sterilisation is effected. When this is complete, sodium chloride or other salt of a light metal is added, whereupon the protein is liberated from the mercury and goes back into solution, whilst the mercury salt forms a soluble double compound with the light metal salt. The inorganic salts are then removed by dialysis.

T. S. Wheeler.

Preparation of 2-nitro-3 : 4-dimethoxy-1-methylbenzene [2-nitrohomoveratrole]. E. Merck, Chem. Fabr., Assees. of M. Oberlin (G.P. 415,315, 21.3.24).—The compound is prepared by treating 4-acetoxy-3-methoxy-1-methylbenzene (acetylcreosole) with fuming nitric acid, hydrolysing and subsequently methylating the nitration product, *i.e.*, a mixture of 2 : 5- and 2 : 6-dinitro-4-acetoxy-3-methoxy-1-methylbenzene, so as to produce a mixture of 2 : 5- and 2 - 6-dinitro-3 : 4-dimethoxy-1-methylbenzene, and subsequently reducing the 5- and 6-nitro-groups to amino-groups, and then replacing them by hydrogen. The product is a yellow oil, b.p. 115—117° at 1 mm., and volatile in steam; on oxidation with potassium permanganate it yields 2-nitrohomoveratric acid, m.p. 200—202°.

L. A. Coles.

Production of tartaric acid from saccharic acid. Diamalt-A.-G. (G.P. 415,685, 4.6.18).—Tartaric acid is obtained by oxidising saccharic acid with hydrogen peroxide. For example, barium peroxide is added at 15° to a solution of saccharic acid in 5% sulphuric acid, obtained by oxidising carbohydrates with nitric acid or oxides of nitrogen in the presence of sulphuric acid, until the whole of the sulphuric acid is converted into barium sulphate. The solution is warmed gradually to 40—50°, filtered, and tartaric acid is precipitated in the usual manner, a 60% yield, calculated on the saccharic acid, being obtained. Alternatively, 30% hydrogen peroxide may be used instead of barium peroxide, the sulphuric acid being subsequently precipitated by the addition of lead or calcium salts.

L. A. Coles.

Production of a water-soluble complex bismuth compound of 7-iodo-8-hydroxyquinoline-5-sulphonic acid. Farbw. vorm. Meister, Lucius, u. Brüning (G.P. 416,329, 18.12.23).—The compound is obtained by treating aqueous solutions of alkali 7-iodo-8-hydroxyquinoline-5-sulphonates with mannitol-bismuth nitrate or sugar-bismuth nitrate solutions, and subsequently separating the complex bismuth compound by the addition of organic precipitants, such as alcohol or acetone. The product, which contains about 13—16% Bi, is of therapeutic value.

L. A. Coles.

Conversion of methyl sulphide into carbon tetrachloride and other chlorinated compounds. Chem. Fabr. auf Actien (vorm. E. Schering), Assees. of A. Hallstein (G.P. 416,603, 1.2.24).—Methyl sulphide, obtained as a by-product in the manufacture of sulphate-cellulose, is freed from all traces of mercaptans, and chlorinated vigorously in the absence of moisture, and preferably in the presence of iodine or other catalysts. For example, dry chlorine is passed at 15° into methyl sulphide free from mercaptans, until no more is absorbed. The product separates into two layers; the upper layer contains trimethylsulphonium chloride, which is worked up into methyl chloride and methyl sulphide, and the lower layer consists of a mixture of sulphur dichloride, carbon tetrachloride, perchloromethyl mercaptan, and *methyltrichloromethylsulphur chloride*, a colourless liquid, *d* 1·642, b.p. 194° at 750 mm., which can be separated by distillation. Perchloromethyl mercaptan and methyltrichloromethylsulphur chloride are coverted into sulphur chloride and carbon tetrachloride on further chlorination. The chlorination proceeds more rapdily in the presence of iodine, and the yields of carbon tetrachloride and sulphur chloride are increased.

L. A. Coles.

Benzoxazolone-5-arsonic acid. L. Benda, Assr. to L. Cassella u. Co. (U.S.P. 1,543,544, 23.6.25. Appl., 17.4.24).—See E.P. 214,628, B., 1925, 149.

Anaesthetic. H. Wieland, Assr. to C. H. Boehringer Sohn (U.S.P. 1,561,130, 10.11.25. Appl., 27.1.25).—See E.P. 205,240; J., 1923, 1199 a.

Manufacture of organic compounds by reactions involving replacement of substituent atoms or groups with liquid reagents. W. V. Shannan, Assr. to Gas Light and Coke Co. (U.S.P. 1,561,491, 17.11.25. Appl., 6.11.23).—See E.P. 212,970; B., 1924, 462.

XXI.—PHOTOGRAPHIC MATERIALS AND PROCESSES.

Influence of photographic fixing baths and their constituents on different metals. M. Eule (Phot. Ind., 1925, 1244—1245, 1273—1274).—The action of (*a*) 20% thiosulphate solution, (*b*) sulphurous acid–sodium sulphite solution, (*c*) an acid fixing bath of (*a*) containing (*b*), and (*d*) a 20% thiosulphate bath containing silver, on lead, copper, tin, iron, aluminium, zinc, brass, and nickel-plated brass, was studied. Data are tabulated, showing the nature of any coating on the metal surface and any precipitate formed, and whether any of the metal is found in the solution, and a table is given from which a quantitative indication of the suitability of any metal for use in a given bath can be ascertained.

W. Clark.

Patents.

Utilisation of luminescent and catalytic substances [*e.g.*, for *X*-ray screens].—P. L. G. Marcotte (U.S.P. 1,546,499, 21.7.25. Appl., 31.7.22). —The fluorescence of substances under the action of *X*-rays varies according to the size of the crystals, and it is advantageous to use crystals between fixed limits of size. For example, the tungstates of zinc, calcium, and magnesium as ordinarily prepared are not efficient substitutes for barium cyanoplatinate, but when used in the form of crystals between 200-mesh and 80-mesh size they are equal and between 150-mesh and 120-mesh size are superior to the cyanoplatinate.

T. S. Wheeler.

Manufacture of photographic films. Kodak, Ltd., Assees. of J. H. Haste (E.P. 232,232, 8.4.25. Conv., 14.4.24).—See U.S.P. 1,532,819; B., 1925, 479.

Colour photography. W. V. D. Kelley and D. Tronolone, Assrs. to Kelley Color Laboratory, Inc. (U.S.P. 1,561,168, 10.11.25. Appl., 5.2.24).— See E.P. 228,887; B., 1925, 866.

XXIII.—SANITATION; WATER PURIFICATION.

Water filter design. J. W. Armstrong (Eng. and Contracting, Water Works Issue, 1925, 64, 847—856; J. New England Water Works Assoc., 1925, 39, 254—271).—In order to obtain highest efficiency in coagulation the water should be violently agitated immediately after addition of coagulant. Later agitation is ineffective. Tests on mixing basins of the around-the-end type, having thirteen 180° turns, showed that there is a progressive increase in the rate of settling, 7—8 hrs. being required for subsidence at the first bend, while less than 2 hrs. was required at the thirteenth turn. The application of lime can be very closely controlled by a potentiometric method by measurement of the hydrogen-ion concentration. If the filters are equipped with sight glasses in which the suspended matter in the effluent is revealed by a beam of light, operation of the filters can be controlled by clarity of the effluent instead of by loss of head. Seepage of water through concrete, particularly where this is subject to frost action, leads ultimately to disintegration. Water of $p_{\rm H}$ value less than 7·5 and alkalinity less than 100 p.p.m. will dissolve calcium carbonate from concrete, and aluminium compounds also slowly go into solution under these conditions, resulting in loss of strength, the rapidity of disintegration depending largely on the porosity of the concrete.

R. E. Thompson.

Fineness modulus for [water] filter sand. R. G. Tyler (Eng. and Contracting Water Works Issue, 1925, 64, 827—832; J. New England Water Works Assoc., 1925, 39, 239—253).—Little or no correlation could be observed between the fineness modulus of a filter sand (*cf.* Abrams, Bull. 1, Structural Materials Res. Lab., 1918; also J. Amer. Water Works Assoc., 11, 677) and observed values of loss of head or transmission capacity in an experimental sand bed. Calculation of the surface modulus of the sand grains from the results of the sieve analysis (*cf.* Abrams and Talbot, Proc. Amer. Soc. Testing Materials, 1919, 19) gave a better correlation, the average deviation of the calculated transmission capacity from the observed values being 24·3%, as compared with 32·6% by Hazen's method (Rep. Mass. State Bd. of Health, 1892, 550). The method of King and Slichter (19th Annual Rep. U.S. Geolog. Survey, Pt. II.), consisting of measuring the time required to pass a known volume of air through air-dried sand under specified conditions, gave an average variation from observed values of only 7·19%, but special apparatus is required for this method.

R. E. Thompson.

Properties of iron compounds and their relation to water clarification. L. B. Miller (U.S. Pub. Health Rep., 1925, 40, 1413—1419).—Experiments on precipitation of iron compounds indicate that "ferric floc" possesses many of the properties of "alum floc," an essential difference being that the aluminium precipitate dissolves readily at higher $p_{\rm H}$ values, forming soluble aluminates, while the ferric precipitate does not. A study of the composition of the precipitate from ferrous sulphate solutions showed that sulphate is at first carried down to an appreciable extent, decreasing finally to nil as increasing quantities of alkali are added. As in the case of aluminium the $p_{\rm H}$ range over which flocculation occurs is determined by the nature and concentration of the anions present. Titration curves of ferrous sulphate, ferric chloride, and ferric alum by alkali are given.

R. E. Thompson.

Clarification of coloured waters. L. B. Miller (U.S. Pub. Health Rep., 1925, 40, 1472—1481).— Experiments with specially prepared "synthetic humus" and with several "colour" samples of the humic acid type showed coagulation of the colour by electrolytes to be due to the cation, the coagulating power increasing with the valency. Addition of hydroxyl ions stabilises the colloid, rendering clarification more difficult. In treatment of water

containing humic substances with alum, clarification is effected by formation of " colour floc " precipitated by the aluminium ion, and formation of " alum floc," by removing aluminium ions from solution, is antagonistic. Therefore a p_H value below 5·4, at which point precipitation of aluminium first approaches completion, is most favourable.
R. E. THOMPSON.

Colloidal clays as emulsifiers for mineral oils used in spraying citrus groves. W. W. YOTHERS and J. R. WINSTON (J. Agric. Res., 1925, **31**, 59—65).—In the preparation of mineral oil sprays for citrus trees, soap solutions were successfully replaced by suspensions of kaolin, fuller's earth, and brick earth clay. The most satisfactory suspensions were prepared by covering the dry clay with the requisite amount of water and allowing to stand unstirred for 30 min. After stirring, the oil was added, and the whole emulsified by pumping twice through an ordinary bucket pump. The emulsion formed a thin paste which remained unchanged for an indefinite period. It covered well, and was as efficient as, and no more injurious to foliage than, soap emulsion. The clay emulsions had the additional advantage that they could be mixed with hard water and other spray materials.
A. G. POLLARD.

Spreaders for spray materials and the relation of surface tension of solutions to their spreading qualities. R. H. ROBINSON (J. Agric. Res., 1925, **31**, 71—81).—Attempts are described to correlate the efficiency of " spreader " solutions with their physical properties. Although, in general, solutions having a low surface tension or low interfacial tension to oil proved the best spreaders, no definite relationship was apparent. Other factors, notably the nature of the sprayed surface, are involved. Water-soluble proteins proved the best spreaders at low concentrations, skimmed milk neutralised with slaked lime being the most practicable preparation. Spreader solutions aided the even distribution of material over the sprayed surface, but did not increase the total amount adhering to the surface.
A. G. POLLARD.

Determination of mercuriferous germicides in liquor used for pickling grain. J. KRAUSS (Z. angew. Chem., 1925, **38**, 1088—1091).—Tests have been made to determine the concentration of the solution of germicide to be added to bring the concentration of a used solution up to the desired strength for use again. With an immersion of 30 min. and using 2 litres of a 0·25% solution of the reagent per kg. of grain, the bulk of the solution after use must be made up with a 0·65% solution in the case of " uspulun," a 0·57% solution in the case of " germisan " (17·5% Hg), and a 0·52% solution in the case of " urania " (5·8% Hg) in order to obtain the original concentration. After pickling for 5 mins. the amount of mercury adsorbed by the grain is 83% with " uspulun," 79% with " germisan," and 55% with " urania " of that adsorbed in 30 mins., which is 81, 90, and 91% respectively of that adsorbed in 1 hr.
A. R. POWELL.

Diffusion of gaseous [fumigating] mixtures through building materials. THILENIUS and POHL (Z. angew. Chem., 1925, **38**, 1064—1067).—The diffusion of mixtures of hydrogen cyanide gas with irritants, such as ethyl chloroformate or chloropicrin through ordinary building materials such as brickwork with and without plaster or wallpaper, breeze concrete with and without plaster, ordinary plaster, etc. was measured. The composition of the gas mixture was altered in passing through the material, the proportion of irritant generally decreasing. This is largely due to the influence of moisture and uncombined lime ; the separation of the mixture is more pronounced with building materials containing a large proportion of fine pores. Paint, paper, etc. have very little influence on the gas mixture. The results of these experiments have an important bearing on the use of an admixture of these irritants to act as a warning in rooms adjacent to those in which hydrogen cyanide is used for fumigation purposes.
B. W. CLARKE.

Destruction of cockroaches and devitalisation of their eggs by cyanogen chloride mixture. C. E. RICE (U.S. Pub. Health Rep., 1925, **40**, 1808—1811).—The cyanogen chloride and hydrocyanic acid developed from sodium cyanide, hydrochloric acid, and sodium chlorate (4 oz., 17 oz., and 3 oz. respectively per 1000 cub. ft.) will kill practically all croton bugs (*Blatella germanica*—the commonest cockroach found on ships) and their eggs in 2 hrs.
R. E. THOMPSON.

PATENTS.

Process of fumigating. W. S. LANDIS and G. H. BUCHANAN, Assrs. to AMERICAN CYANAMID Co. (U.S.P. 1,559,892, 3.11.25. Appl., 8.7.21).—After fumigating the hydrocyanic acid is decomposed by the introduction of a mixture of a volatile aldehyde an ammonia.
C. O. HARVEY.

Purification of air containing ammonia. G. ST. J. PERROT and M. YABLICK (U.S.P. 1,559,980, 3.11.25. Appl., 10.1.19. Renewed 24.7.25).—Air vitiated with a high concentration of ammonia is rendered suitable for breathing by passage through a granular mass containing crystals of hydrated copper sulphate (*cf.* J., 1920, 105 A).
C. O. HARVEY.

Insecticide. G. E. SEIL and O. F. HEDENBURG, Assrs. to F. O. MOBURG, and ROESSLER and HASSLACHER CHEMICAL Co. (U.S.P. 1,559,961, 3.11.25. Appl., 28.5.21).—A 1% or more dilute aqueous solution of acetone cyanohydrin is claimed as an insecticide.
C. O. HARVEY.

Disinfectants. ERDÖL- U. KOHLE-VERWERTUNG A.-G., and F. ZERNIK (G.P. 416,599, 9.10.21).—Disinfectants are obtained by neutralising solutions containing creosote from lignite tar with naphthenic acids or sulphonated naphthenic acids. The products, which are diluted with water to about 30% creosote content, yield on further dilution stable emulsions possessing good disinfecting properties.
L. A. COLES.